



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

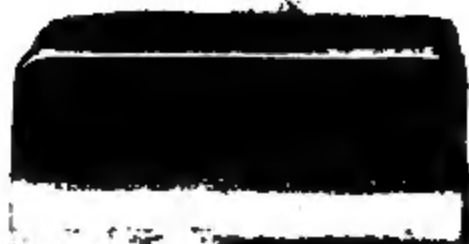
Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



J
8
M





M

PUBLIC DOCUMENTS

OF

MASSACHUSETTS:

BEING THE

ANNUAL REPORTS

OF VARIOUS

Public Officers and Institutions,

FOR THE YEAR

1870.



PUBLISHED BY THE SECRETARY OF THE COMMONWEALTH,
Under authority of Chapter 4 of the General Statutes.

VOL. IV.

Nos. 27 to 37.

BOSTON:

WRIGHT & POTTER, STATE PRINTERS,
79 MILK STREET (CORNER OF FEDERAL).

1871.

INDEX TO PUBLIC DOCUMENTS.

Vol. IV.

Documents numbered 27 to 37, inclusive.

A.

Abstract of Returns of Railroad Corporations, . . .	No. 35
Aggregates of Polls, Property, Taxes, &c., . . .	36

B.

Blind, Asylum for, and Perkins Institution, Report of Trustees of, .	27
Board of Health, State, Report of Secretary of, . . .	37

C.

Chappequiddic and Christiantown Indians, Report of Guardian of, .	29
Commissioners, Railroad, Report of,	35

D.

Dudley Indians, Report of Guardian of,	30
--	----

H.

Health, State Board of, Report of Secretary of,	17
---	----

I.

Idiotic and Feeble-Minded Youth, Report of Trustees of School for, .	28
Indians, Chappequiddic and Christiantown, Report of Guardian of, .	29
Dudley, Report of Guardian of,	30
Herring Pond, Report of Treasurer,	31
Marshpee, Report of Treasurer,	32
Natick, Report of Guardian of,	33
Troy, Report of Guardian of,	34

M.

Marshpee, Report of Treasurer of District of,	32
---	----

INDEX.

P.

Perkins Institution and Massachusetts Asylum for the Blind, Report of Trustees of,	No. 27.
Polls, Property and Taxes, Aggregates of,	86

R.

Railroad Corporations (and Railroad Commissioners), Reports of, .	85
---	----

S.

School for Idiotic and Feeble-Minded Youth, Report of Trustees of,	28
State Board of Health, Report of Secretary of,	87

T.

Taxes, Polls, Property, &c., Aggregates of,	86
---	----

PUBLIC DOCUMENT.....

.....No. 27.

THIRTY-NINTH ANNUAL REPORT

OF

THE TRUSTEES

OF THE

PERKINS INSTITUTION

AND

Massachusetts Asylum for the Blind.

OCTOBER, 1870.

BOSTON:

WRIGHT & POTTER, STATE PRINTERS,
79 MILK STREET, (CORNER OF FEDERAL.)

1871.

PERKINS INSTITUTION AND MASSACHUSETTS ASYLUM FOR THE BLIND, }
BOSTON, Jan. 16th, 1871. }

Hon. OLIVER WARNER, *Secretary of State.*

SIR :—I have the honor to submit to the Corporation and to the Legislature, the Report of the Perkins Institution and Massachusetts Asylum for the Blind, for the year ending September 30th, 1870.

Respectfully,

SAML. G. HOWE.

TRUSTEES' REPORT.

PERKINS INSTITUTION AND MASSACHUSETTS ASYLUM FOR THE BLIND, }
BOSTON, Oct. 31, 1870. }

To the Corporation.

GENTLEMEN :—The undersigned Trustees respectfully submit the following Report for the year ending September 30th, 1870.

The objects of the Institution, and the methods by which they are carried out, have been too frequently set forth to need repetition here.

The number of blind persons connected with the establishment as pupils, workmen or women, or as employés, at the date of the last report, was one hundred fifty-five ; twenty-five have entered since ; thirty have been discharged ; so that the present number is one hundred fifty.

There are no changes to report in regard to persons employed, or in the general condition of the Institution. The statistics of entrances, discharges and the internal condition of the establishment are reported to our Board by the Director, at stated periods. You are referred to them and to his special report for details.* The Trustees merely repeat, what has been stated in so many former reports, their entire satisfaction with the management and the internal condition of the establishment.

The report of the Treasurer sets forth the receipts and expenditures of the year, both of which, owing to construction account, have been uncommonly large. An analysis is given which shows first, the ordinary receipts and expenditures ; second, the amount paid for stock, and the amount received for sale of goods ; third, the building account.

* See Appendix, Financial Statement, &c.

First. Ordinary receipts amount to \$43,977.22, which is made larger than usual by payment of arrearages due from States; ordinary expenditures amount to \$35,722.88, which is considerably less than those of the preceding year.

Second. The expenses of work department, including wages paid to blind workmen and women, shop rent, and cost of stock, &c., were \$21,346.39, and the receipts from sales of articles manufactured were \$22,719.92.

Third. The building account, the total receipts on which were \$80,000 + \$15,000 = \$95,000 from the State of Massachusetts; \$23,975.01 from subscriptions. The expenditures, including \$17,830.39 paid for land, have been \$125,549. The work is not yet completed, but it is in such a state of forwardness that its whole cost can be very nearly estimated. It will be within the estimates. It may be well here to refer to the circumstances and considerations.

The annual reports of the Director, for several years, have set forth the importance of reorganizing the Institution, and bringing it, as nearly as possible, to a strict family system. Several committees had considered the subject and recorded the recommendation. The matter was discussed at the monthly meetings during several years, until it was the unanimous conclusion that the reorganization was desirable and should be carried out as soon as practicable. When, through the liberality of the legislature and of the public, about \$120,000 were made available, it was resolved to enter upon the work seriously, and to carry out the plan as far as practicable with the means. The first question was, whether the establishment should be removed to the country or retained in or near the city.

Almost all persons, on first consideration of the subject, were inclined to think that a location in the country would be the best; but closer examination causes them to change their opinions.

An exhaustive discussion of the matter may be found in the annual report for 1868. It was there shown to general satisfaction that in order to have an Institution of the first-class, for teaching and training the blind, it should be located within easy walking distance of the centre of a large, cultivated and musical community. The arguments and considerations of

that report were carefully considered by the legislative committee of 1868, upon whose recommendation the grant of \$80,000 was made.

It being admitted that the Institution must be near the centre of the city, the next question was whether some other suburb of Boston, or Cambridge, would not afford as good a site, and at less cost, than South Boston. In order to have a clear field, the Trustees offered the main building for sale ; but although the land could be sold at a good price, the building could not.

After it was settled that the Institution should remain at South Boston, two plans for re-arranging the premises were considered : the first was to take down the main building and grade the whole lot, which would then give a clear surface of 100,000 square feet. Then upon this clear lot, bounded upon three streets, to build several separate cottage dwelling-houses for boys and others for girls ; with a central building to which all should have access, and which should contain school-rooms, music-rooms, workshop, &c. An ingenious plan for such an establishment, with a beautiful sketch of the buildings, was prepared by Messrs Cummings & Sears, and it seemed to approach the highest ideal of buildings and grounds for an institution for the blind. It would, however, have been too costly,—not for the purpose, but for the means at command.

The uniform policy of the Institution has been to incur no debts, and the adoption of such a plan, seductive as it seemed, would have almost certainly involved debts. The two grants from the State amounted to \$95,000 ; and even if, as some hoped, an equal sum could have been raised by subscription, still it would have been hazardous to undertake the work in the face of the facts, that the lowest estimates were \$200,000, and that the new State Institution for the Blind in Western New York cost over \$200,000, and the legislature of Ohio had just found it necessary to appropriate \$250,000 for a new building for the State institution.

Taking down the old building would have been a great sacrifice. It is 113 feet long, 41 feet broad, with two wings, running 40 feet back ; and six stories high. It was substantially built of the best materials, wood and stone, with slate roof, copper gutters, &c. It contained fifty-one thousand feet of flooring.

A substantial structure, with an equal amount of room, could not be built for a hundred thousand dollars. Its market value has indeed been greatly damaged by the injudicious action of the city government, which decided to lower the grade of Broadway fifteen feet. The building, as originally located, was elevated a little above the street, and just far enough back from the sidewalk to be accessible by an easy flight of steps. Dropping the sidewalk fifteen feet, left the building at an undue and very inconvenient elevation, and accessible only by a long flight of steps which were unsightly to look upon, toilsome to ascend, and badly exposed to wind and rain. Moreover, the great elevation had made it necessary to erect sharp embankments on Broadway, and on H and Fourth Streets, which were costly, and which rendered entirely useless about 17,000 feet of land—worse than useless, for children were exposed to roll down them.

Again, the building had become damaged by the wear and tear of thirty years' usage. All repairs except those absolutely necessary had been postponed in consequence of some uncertainty about its being retained. It had not a suitable or safe heating apparatus, but was heated by furnaces and stoves. Again, however spacious and commodious in many respects, it was not well calculated for division into two parts for the two sexes. A formidable objection was, that all the pupils lived in it, and many of them were necessarily lodged upon the fifth story, and would necessarily have been endangered in case of fire. These disadvantages could all be overcome by alterations and additions, which, though expensive, would upon the whole be a great saving in comparison with the cost of new buildings.

First. The difficulty occasioned by change of grade of the street could be overcome by building up a heavy bank-wall on the front and east sides, making a driveway by which carriages could set down passengers under a *porte cochère*.

The other difficulties could be overcome by putting in a steam apparatus; by thoroughly repairing and painting the building; and by adapting it to one sex.

The committee therefore proceeded to carry out the plan which the Trustees had formally adopted, and the details of which were left to them.

GRADING, BANK WALLS, PORTE COCHERE.

After the decision to retain the location and the main building, the next step was to fix upon the proper grading for the grounds, and to plan a suitable drive-way and means of easy access from Broadway to the front door of the house.

The grading presented no other difficulty than that of the cost, which is necessarily great in a soil so stubborn that it soon dulls pickaxes. The other part was more difficult. Several architects were consulted, models were made and different plans were carefully studied before a satisfactory solution was found to the problem to get a safe drive-way up the sharp bank, with room enough to turn a coach in the narrow space between the front of the house and Broadway. The credit of solving it is mainly due to Mr. Daniel L. Bradford, steward of the Institution. The plans were made and the work let out by Messrs. Jonathan Preston & Son; the cost of granite to be \$4,600, the cost of mason-work to be \$2,425. The contract for stone stipulated that it was to be delivered before August 1st, but the contractors failed to come to time, and, notwithstanding all our remonstrances and efforts, they could not be made to deliver all the stone in such season that it could be safely laid, owing to liability to frost. Owing to this culpable delay, for which the Institution has a fair claim for damages, the work on Broadway only could be finished; that on the east side must be postponed until next spring, as the risk of frost, which would spoil the cement, is too great. The work, however, is finished on the whole length of the front and part of the way on the east side, and it fully answers all reasonable expectations. It is highly ornamental and very useful. It is a substantial and sightly piece of masonry, built of large blocks of Maine granite. It restores the original line of level of the street, and, consequently, the architectural symmetry of the whole front.

It furnishes an easy rise on foot or by carriage to a heavy *porte cochère*, under which is a short flight of steps to the front door.

The most interesting feature of the new arrangement is the provision of

SEPARATE DWELLING-HOUSES FOR FAMILIES.

Four such had been commenced last year, after the plan had been approved by the governor and council. They have been finished within this year, and are now occupied by the female pupils. They are built upon the north side of the main lot, facing upon Fourth Street. They have land enough around them not only for free light and air, but also for garden and walks. In the rear is an open area extending to Broadway.

Each house is a plain but comfortable and commodious dwelling for a family of from twelve to fifteen persons, and is furnished with all the conveniences and appliances of modern houses,—water-closets, bathing-rooms, and the like. Each has a kitchen, wash-room, dining and sitting rooms, and small bedrooms, the most of which are calculated for one single bed. Each house has the necessary facilities for housekeeping, and furnishes the means and opportunity for teaching girls by practice and by daily routine the economy of a frugal and orderly household.

The houses were planned by Messrs. Cummings & Sears, and built by contract under their supervision. The total cost was \$40,706.91.

SCHOOL-HOUSE FOR GIRLS.

The plan of dividing the institution into two parts, one for each sex, and of subdividing each part into separate families, could have been but imperfectly carried out if, as was at one time contemplated, the girls had been obliged to resort daily, and several times a day, to the main building for their lessons. The division could be effectual only by erecting a building in the premises allotted to the girls, and hard by their dwellings, which should contain school-rooms, music-rooms, exercising rooms and the like, so that they would not be obliged to resort to the main building at all. This would make the separation complete. It would, moreover, be natural, and as a matter of course, because arising from the organic structure of the premises. The separation would maintain itself, and not require those arbitrary rules and that watchful supervision which, however necessary when a large number of young persons of opposite sexes live under the same roof, are apt to breed ill-feeling, and even to defeat the object in view. Rarely gifted

superintendents, aided by rarely gifted matrons, may exercise this supervision effectually and create no ill-feeling, but institutions must be so arranged that they can be administered by ordinary mortals, and ordinary mortals in our American institutions with the sexes congregated have usually failed to manage this delicate matter satisfactorily, although it draws so largely on their time and patience.

It was felt that if means of domestic training, instruction, and the study and practice of music existed in the department for girls, this matter would take care of itself, for the department would really be a separate and independent institution, and yet be under the same general administration as that for the boys.

In order to bring about so desirable an end, a neat and commodious building, designed by Mr. Henry Richards, has been erected in the rear of the dwelling-houses and half-way between Fourth Street and Broadway. It is sixty feet long, twenty-two feet broad and three stories high. It stands in the centre of the lot, and of course has full exposure to the sun on the south, east and west, and to the air on all sides.

The lower floor, slightly excavated, is intended for gymnasium, and a place for work and for play. It is well lighted on four sides, and is provided with wash-bowls, closets and other conveniences. The second floor is divided into small rooms for practising the piano, with a central room for teaching.

The third floor may be divided into three school-rooms by folding-doors, or thrown into one hall. The centre room is larger than the others, and is beautiful and commodious. By carrying the floor over the entry-way of the second story a large recess is obtained for an organ, and by carrying up the roof in the centre we get a lofty oval ceiling. This arrangement is not only sightly, but it gives volume of air for organ music, which would be oppressive with a low ceiling.

Above are large attics, which can be divided off into four practising rooms for the piano when they shall be needed.

This building has been erected under the direction of Mr. Bradford, and by day's work. The cost is, in round numbers, \$11,000.

HEATING AND VENTILATING—LAUNDRY.

There were seven buildings to be heated in winter, and ventilated at all times.

First. The main building. This had never been provided with a sufficient or with a safe means of heating. The work was done as well as could be with five large furnaces and five stoves.

Second. The group of four dwelling-houses for girls.

Third. The school-house for girls.

Fourth. The men's workshop, to be placed on Fourth Street, opposite the houses.

Clearly the best way of heating these was by steam, and the boiler-house should be as near the centre as could conveniently be. About the whole line of the south boundary of our lot upon Fourth Street was an embankment twenty-four feet high, and so steep that a close fence had to be maintained on the top, and at a distance of twenty-four feet from the street, the whole intervening space being too steep for use.

It was decided to cut away this embankment and erect a perpendicular bank wall, between which and the street would be a level sixteen feet wide, to erect a brick house at the west end which should contain steam-boilers and coal-bins in the basement and a laundry on the next floor. From this building, as from a common centre, steam-pipes radiate to all the other buildings.

This boiler-house is connected with the main house by a glass covered way seventy feet long and sixteen feet wide. The roof, which is all glass, is seven feet from the ground in front, and rises at an angle of 45° to the bank, where it is sixteen feet high and level with the play-ground. It will serve not only for such connections, but be a delightful place for recreation in bad weather. It is intended that the high brick wall shall be covered on the inside with creeping plants, the glass roof in front hung with grape-vines, the elevated part in the rear can support fragrant flowers; the middle will be kept clean for promenade and for sport. The steam-pipes for heating the main building necessarily run through the whole length of this green-house, and will not only keep out frost, but will secure the fresh verdure all winter.

The plans for this work were made by Messrs. Cummings & Sears, who invited proposals for building the brick walls and the boiler-house, and separate proposals for the whole heating apparatus.

Contracts were made by them for the former with Mr. Wm. Sayward for \$14,060.

In view, however, of the difficulty of making calculations of the cost of the work to be done in the main building, it was concluded to have the heating apparatus done by day's work. A contract was therefore made with Messrs. George W. Walker & Co. to supply workmen at stipulated prices, and to furnish all piping and other material at the lowest wholesale prices.

Steam was let on October 27th, and the arrangements have thus far proved satisfactory. There has not, however, as yet, been any weather to test the capacity of the apparatus.

AN ACCOUNT OF THE ORDINARY WORK OF THE YEAR, and comments thereupon, will be seen in the following extracts from the Director's report :—

“The summer vacation was necessarily prolonged, owing to the condition of the premises: but still a satisfactory year's work has been done.

“The school in the juvenile department has been carried on with its usual good results.

“The pupils are instructed in the usual English branches which are taught in the best common schools, and they make about as much progress as ordinary scholars do. A few follow an advanced course of mathematics, and a small class study Latin and Greek and are preparing for the University.

“Of course it is not necessary nor desirable that blind children should have what is called a classical education, nor that Latin and Greek shall form part of the course of instruction in public institutions for the blind; but there are many reasons why facilities for such education and instruction should exist somewhere in our country.

“First, the purpose of the public organized efforts made here in behalf of the blind differ in this respect from those made in Europe (especially in Great Britain). There the purpose is chiefly to lighten the burden of the individual sufferer and to increase his welfare; while here it is also to raise the whole class in the social scale.

“We ought to make this difference more salient; and we can do it. There the blind are, as it were, socially disfranchised; we should enfranchise them fully. We in this country know well the cruel effects of prejudice. Let not those whom all pity and would fain make happy suffer from any mere prejudice. This matter is worth considering a little. In every generation there is a constant number who lack one of the ordinary senses, as that of sight or of hearing. This common peculiarity causes them to be grouped arbitrarily in classes of deaf and dumb, or blind. This arbitrary classification being of the nature of segregation acts unfavorably upon those who aspire to social equality with their fellows. In a wisely organized society, after efforts to diminish to its minimum the production of imperfect members, the industrial scheme should be so contrived as to utilize as many as possible of every persistent class. We know they must come. We know (almost precisely) in what numbers; let us adapt our industrial scheme so as to utilize them.

“But the industrial scheme of every country, being based upon the supposed possession of sight, while it admits the mute to partial communion, entirely excludes the blind. Hence, partly, the fact that the class peculiarities of the latter become more salient, and their social segregation more complete.

“We hear or think little about mutes, except when they are gathered together in schools for instruction, because they are fused into the industrial class; but the class characteristics of the blind show out more saliently because they are now industrial. We have left them out of the calculation; and we find it easier to support them in idleness than to re-cast our industrial scheme,—just as people give alms to a beggar and virtually bid him beg forever, rather than continue to set him at work to earn his daily bread.

“One of the grievous but not necessary burdens with which the blind are so heavily laden, comes from the common idea that they are and must ever be helpless and dependent. The blind man's historical place is the beggar's post. Bartimeus sat begging at the gates of Jericho; and when Belisarius became blind, his hand that had upheld a falling empire was stretched out for alms. In the public mind, therefore, blindness is naturally associated with dependence and pauperism.

“Few persons consider how much anguish this popular opinion adds to the sore calamity of blindness. Love of approbation is strong in the blind, as a class. This makes them almost morbidly sensitive to the opinion of those about them. Ordinary culture, by making them more noticed, increases this sensitiveness in all of

them, and in some increases it to a painful degree, so that they constantly quiver like aspen leaves in the real or imaginary breath of approval or censure; while only a few of them ever get culture enough to rise above the clouds of prejudice, to be unruffled by the current and eddies of opinion, and to rest calmly in the great realities of existence.

"This gross error of popular judgment ought to be dissipated by every possible means; among these means are instances of blind men making high acquirements in various branches of knowledge and of science. Mr. Millman does not preach about the blind, but in every good discourse he helps to elevate the class. Let such instances be multiplied; because every one will help to dispel prejudice, and vindicate the claim of his class to social equality with cultivated society. Second, it is evident that a blind youth who is to make music his calling, will (other things being equal) take higher rank, and exercise wider influence, if he receive such culture that he can associate upon equal terms with scholars and cultivated persons, than can be had by a blind youth who confines his attention to the study and practice of music. Third, among youth who go out from the institutions for the blind in the United States, there are a few who have the desire and the ability to receive instruction of a higher kind than is given there.

"Moreover there are some blind youth who do not enter the public institutions, partly perhaps from a false pride about being associated with what are popularly considered as mere charity schools; and partly because such schools do not usually hold forth the means of high culture and classical instruction.

"An institution for the education of blind children of the gentry, has long existed in Yorkshire, England; and one has been recently established in Worcester, called the "College for the Blind Sons of Gentlemen." Among the pupils of the latter are two from the United States.

"The social and political spirit of our own country forbids building institutions upon the basis of rank, or administering them so as to favor the growth of artificial distinctions; but a blind person who wants and can pay for the highest kind of instruction and for a classical education, ought not to be obliged to go to England for it; and if the truth were known he need not do so.

"This institution is prepared to give a thorough course of instruction in all the ordinary and in the higher branches of school learning; in vocal and instrumental music; in Greek, Latin and the classics.

"The special schools above alluded to possess no known advan-

tages over ours for acquiring knowledge, while the advantages which they present for the study and practice of music seem to be decidedly less."

The report of last year set forth the great advantages which our pupils, who devote themselves to the study of music, enjoy from hearing the best performers.

These have grown no less. Nor has the excellence of the instruction which they receive in the institution at all diminished.

Their instruments, too, are of the best kind. Six new Chickering square pianos, and one German grand, have been procured within the year to replace those impaired by many years of constant service.

Accounts continue to be received of former pupils who are now earning good livelihoods.

The great attention which has been given during several years to training good tuners of pianos is bearing ample fruit.

Several young men who despaired of success in any other calling are succeeding in this.

For further and more minute information concerning the Institution, the Trustees respectfully refer to the special report of the Director.

All of which is respectfully submitted, by

ROBERT E. APTHORP,
THOMAS T. BOUVÉ,
FRANCIS BROOKS,
SAMUEL ELIOT,
GEORGE S. HALE,
AUGUSTUS LOWELL,
E. R. MUDGE,
EDWARD N. PERKINS,
JOSIAH QUINCY,
BENJAMIN S. ROTCH,
JAMES STURGIS,
SAMUEL G. SNELLING,

Trustees.

Dr.	Perkins Institution and Massachusetts Asylum for the Blind in account with Wm. Endicott, Jr., Treasurer.	Cr.
1869.		
Nov. 3,	To cash paid draft No. 265, . . .	\$1,346 39
16,	draft No. 266, . . .	2,605 00
Dec. 8,	draft No. 267, . . .	3,015 39
1870.		
Jan. 11,	To cash paid draft No. 269, . . .	1,630 05
Feb. 7,	draft No. 270 and 271, . . .	7,500 00
Mar. 12,	draft No. 274, . . .	2,658 02
18,	draft No. 277, . . .	1,543 43
Apr. 21,	draft No. 279, . . .	1,099 53
May 8,	draft No. 280 and 282, . . .	1,992 34
July 22,	draft No. 288, . . .	7,500 00
28,	draft No. 289, . . .	1,465 69
30,	draft No. 290, . . .	1,000 00
	To balance, . . .	2,167 39
		922 66
		2,684 58
		2,250 00
		7,500 00
		1,584 78
		\$72 00
		2,350 00
		2,400 00
		4,822 00
		2,924 78
		7,500 00
		5,062 12
		\$70,774 15

The undersigned, a Committee appointed to examine the accounts of the Perkins Institution and Massachusetts Asylum for the Blind, for the year 1869-70, have attended to that duty and hereby certify that they find the accounts properly vouched and correctly cast, and that there is a cash balance in the hands of the Treasurer of sixty-one hundred and seventy dollars and ninety-five cents on ordinary account, and twenty-six hundred and ninety-one dollars and seventy-seven cents on special account. (See p. 23.) The Treasurer also exhibited to us the following property belonging to the Institution:—

Five Bonds (\$1,000 each) of the New York Central Railroad, valued at	.	.	.	.	.	\$4,700 00
F. M. Josselyn's Mortgage Note,	.	.	.	.	.	14,691 75

14,891 76

W. A. WELLMAN,
A. T. FROTHINGHAM, } *Auditing Committee.*

DETAILED STATEMENT OF TREASURER'S CASH ACCOUNT.

1869-70.

DR.

To drafts of the Auditor of Accounts, Nos. 265 to 290, inclusive,	\$64,603 20
cash on hand, Sept. 30, 1870,	6,170 95
	<u>\$70,774 15</u>

1869.

CR.

Oct. 1.	By balance cash,	\$1,346 39
4.	cash from State of New Hampshire,	2,605 00
Nov. 16.	By amount from Dr. Howe, as per following:	
	From work department, balance September 30,	\$161 61
	From work department for month of October,	2,853 78
		<u>3,015 39</u>
Dec. 8.	From work department for month of November,	1,630 05

1870.

Jan. 1.	By cash from State of Massachusetts,	7,500 00
24.	cash from Dr. Howe:—	
	From Thomas Fraser, account board and tuition of son,	\$250 00
	From Mrs. Major, account board and tuition of son,	100 00
	From Mrs. S. S. Gage, account board and tuition of F. Spencer,	125 00
	From Rev. F. R. Tane, account board and tuition of niece,	183 44
	From sale of musical instrument to pupil,	25 00
	From Levi Marsh, account Laura Bridgman,	80 00
	From donation of Miss Wasgatt,	2 00
	From sale of old barrels, old iron and soap grease,	93 47
	From sale of books in raised print,	72 00
	From proceeds of concerts,	139 00
	From sale of brooms in boys' shop,	125 00
	From work department for month of December,	1,463 11
		<u>2,658 02</u>
	Amount carried forward,	\$18,754 85

Amount brought forward, \$18,754 85

1870.

Feb. 23. By cash from Dr. Howe:—

From work department for month of January, . 1,543 43

Mar. 19. From work department for month of February, . 1,099 53

Apr 20. From proceeds of concerts at Salem
and Waltham, \$158 07

From sale of brooms in boys' shop, . 73 00

From donation of William Bragg, of
London, to printing fund, . . 29 33

From George Ryder, account board and
tuition of son, 100 00

From William Brownell, account board
and tuition of daughter, . . . 133 73 •

From sale of soap grease, old iron, &c., 70 09

From sale of books in raised print, . 14 47

From work department for month of
March, 1,413 65

1,992 34

May 12. By cash from State of Massachusetts, 7,500 00

21. cash from Dr. Howe:—

From work department for month of April, . 1,465 69

9. cash from estate of Samuel May to print book, . 1,000 00

June 28. cash from Dr. Howe:—

From work department for month of May, . 2,167 39

July 8. cash from Dr. Howe:—

From Rev. F. R. Tane, account board
and tuition of niece, \$186 65

From Mrs. Emerson, account Charles
Reed, 75 00

From Mr. Talcott, account tuition
Faith Ann Spencer, 25 00

From Mrs. Skinner, account tuition of
son, 63 00

From William P. Howland, account
tuition of daughters, 65 82

From Thomas Fraser, account tuition
of son, 250 00

From sale of books in raised print, . 30 65

From sale of tickets of admission to
institution, 58 54

From sale of brooms made in boys' shop, 168 00

922 66

8. By cash from State of Connecticut, for beneficiaries

from May 1, 1868, to May 1, 1869, 2,684 58

Amount carried forward, \$39,130 47

Amount brought forward, . . . \$39,130 47

1870.

July 8.	By cash from State of Connecticut, for beneficiaries		
	from May 1, 1869, to May 1, 1870, . . .	2,250 00	
9.	cash from State of Massachusetts, . . .	7,500 00	
	cash from Dr. Howe :—		
	From work department for month of June, . .	1,584 78	
Sept. 28.	From C. N. Andrew for board and tuition of son, . . .	\$50 00	
	From sale of books in raised print, . . .	22 00	
		<hr/>	72 00
28.	cash from State of Vermont for beneficiaries, . .	2,350 00	
	from Rhode Island for beneficiaries, . . .	2,400 00	
28.	cash from Dr. Howe :—		
	From work department for month of July, . . .	\$1,548 24	
	From work department for month of August, . . .	1,376 54	
		<hr/>	2,924 78
30.	cash from State of Massachusetts, . . .	7,500 00	
30.	cash from Dr. Howe :—		
	From amount received from workshop for use of horse and wagon, and board of teamster, . . .	\$650 00	
	From work department for month of September, . . .	4,412 12	
		<hr/>	5,062 12
			<hr/>
			\$70,774 15

ANALYSIS OF TREASURER'S ACCOUNT.

The Treasurer's Account shows that the total receipts during the

year were,	\$70,774 15
Deducting cash on hand at beginning of year,	1,346 39
	<u>\$69,427 76</u>

Ordinary Receipts.

From State of Massachusetts,	\$30,000 00
beneficiaries of other States and private pupils,	13,977 22
	<u>\$43,977 22</u>

Extraordinary Receipts.

From work department for cash received for articles	
made by the blind,	\$22,719 92
donations to printing fund,	1,031 33
sale of books in raised print,	139 12
sale of musical instrument,	25 00
sale of brooms of boys' shop,	366 00
sale of old barrels, soap grease, old iron, &c.,	163 56
sale of tickets of admission to institution,	58 54
proceeds of concerts,	297 07
use of horse and wagon, and board of teamster	
of workshop,	650 00
	<u>25,450 54</u>
	<u>\$69,427 76</u>

GENERAL ANALYSIS OF STEWARD'S ACCOUNT, Oct. 1, 1870.

DR.

Receipts on drafts from Treasurer, on ordinary	
account,	\$64,603 20
on drafts from Treasurer, on special ac-	
count,	112,521 91
Balance due Steward, on special account,	2,358 76
	<u>\$179,483 87</u>

CR.

Liabilities due October 1, 1869,	\$214 52
Ordinary expenses, as per schedule annexed,	35,722 88
Extraordinary expenses, as per schedule annexed,	137,463 32
Balance in hands of Steward on ordinary account,	6,083 15
	<u>\$179,483 87</u>

**ANALYSIS OF EXPENDITURES FOR THE YEAR ENDING SEPTEMBER 30,
1870, AS PER STEWARD'S ACCOUNT.**

Meat, 15,026½ lbs.,		\$2,673 08
Fish, 1,820¾ lbs.,		325 78
Butter, 2,926¼ lbs.,		1,197 66
Rice,		271 86
Bread, flour, meal, &c.,		712 02
Potatoes and other vegetables,		495 06
Fruit,		228 41
Milk,		993 54
Sugar,		661 42
Tea and coffee,		243 84
Other groceries,		370 58
Sundry articles of consumption,		277 44
Gas and oil,		300 34
Coal and wood,		2,566 86
Salaries, superintendence and instruction,		10,933 91
Wages,		1,657 32
Outside aid,		318 10
Laundry,		717 47
Clothing and mending,		24 67
Furniture,		1,956 06
Musical instruments,		576 03
Expenses of stable,		1,506 10
of boys' shop,		744 81
of printing office (including wages of printer),		1,249 89
Books, stationery, &c,		581 45
Medicines and medical aid,		30 36
Board of blind men,		1,270 41
Taxes,		18 84
Water rates,		149 43
Post-office box,		4 83
Insurance,		550 00
Reports and postage therefor,		122 44
Sewing machine,		51 95
Repairing clock,		33 20
Board during vacation,		45 75
Hack hire,		30 50
Sundries,		346 61
Ordinary construction and repairs,		1,485 46
		<hr/>
		\$35,722 88
Extraordinary construction and repairs,	\$107,718 61	
Land,	7,162 06	
Donation from Harvard Musical Society paid to F. J. Campbell,	245 01	
Advertising and circulars,	508 13	
Lectures,	50 00	
Trip through N. E. States in search of pupils,	140 86	
Cow,	225 00	
Interest,	18 52	
Bills to be refunded,	48 74	
	<hr/>	
Expenses of work department,		116,116 93
		21,346 39
		<hr/>
		\$173,186 20

GENERAL ABSTRACT OF ACCOUNTS OF WORK DEPARTMENT, OCTOBER 1, 1870.

Liabilities.

Due Institution for investments at sundry times, .	\$19,378 42	
Institution for interest on the above, . . .	1,162 70	
sundry individuals,	2,559 11	
	<u> </u>	\$23,100 23

Assets.

Excess of receipts above expenditures (paid to Treasurer),	\$1,373 53	
Stock on hand, October 1, 1870,	5,417 77	
Debts due,	2,857 52	
	<u> </u>	9,648 82
Balance against work department, Oct. 1, 1870,	\$13,451 41	
against work department, Oct. 1, 1869,	12,062 24	
	<u> </u>	
Total cost of carrying on work department,		\$1,389 17

ANALYSIS OF ACCOUNTS OF WORK DEPARTMENT.

DR.

Liabilities of October 1, 1869,	\$714 36	
Salaries and wages paid blind persons,	3,891 27	
Salaries and wages paid seeing persons,	1,681 85	
Sundries for stock, &c.,	15,058 91	
Excess of receipts over expenditures, paid to Treasurer,	1,373 53	
	<u> </u>	\$22,719 92

CR.

Cash received during the year,	\$22,719 92	
--	-------------	--

Dr. PERKINS INSTITUTION AND MASSACHUSETTS ASYLUM FOR THE BLIND in account with Wm. ENDICOTT, JR., Treasurer, Special Account. Cr.

1870.		1869.		1870.		1869.	
Jan. 3,	To cash paid for land,	\$10,668 33	Dec. 30,	By State of Massachusetts,	\$15,000 00		
7,	draft No. 268,	3,000 00					
Feb. 11,	draft No. 272,	5,000 00					
Mar. 1,	draft No. 273,	10,000 00	Jan. 24,	cash from F. M. Josselyn on account purchase of land,	1,000 00		
12,	draft No. 274,	657 17	29,	from State of Massachusetts,	25,000 00		
30,	draft No. 276,	7,162 08	Mar. 19,	from State of Massachusetts,	15,000 00		
April 25,	draft No. 278,	6,000 00	June 1,	from F. M. Josselyn on account of land,	1,000 00		
June 1,	draft No. 281,	4,000 00	24,	from State of Massachusetts,	25,000 00		
25,	draft No. 283,	244 20	Aug. 1,	interest from deposit with C. F. Hovey & Co.,	924 77		
25,	draft No. 284,	10,000 00	31,	cash from State of Massachusetts,	15,000 00		
July 22,	draft No. 285,	15,000 00	Sept. 27,	from sale of land to F. M. Josselyn, Nov. 16,			
Aug. 11,	draft No. 286,	13,772 24		1869, \$19,589 00			
Sept. 28,	draft No. 287,	5,000 00		less payments, 2,000 00			
27,	cash loan to F. M. Josselyn on mortgage dated			cash from F. M. Josselyn, interest to Sept. 27, 1870, .	17,589 00		
	June 4, 1870, payable within two years from	14,691 75		from subscriptions as per schedule,	1,104 98		
27,	Nov., 1869, with interest at 7 per cent.,				23,975 01		
	cash paid for revenue stamp to deed F. M.						
	Josselyn,	20 00					
Oct. 13,	drafts No. 291 and 292,	10,000 00					
Nov. 3,	draft No. 293,	2,000 00					
5,	draft No. 294,	8,000 00					
14,	draft No. 295,	6,000 00					
28,	draft No. 296,	6,686 24					
30,	balance down,	2,691 77					
		\$140,593 76			\$140,593 76		
			1870.	By balance down,	\$2,691 77		
			Nov. 30,				

LIST OF SUBSCRIPTIONS.

Wax Work Exhibition,	\$1,550 00	G. F. Parkman,	\$200 00
David Sears, . . .	1,000 00	W. G. Weld, . . .	200 00
J. M. Forbes, . . .	1,000 00	J. B. Beebe, . . .	200 00
Henry L. Pierce, . . .	1,000 00	G. Howe, . . .	200 00
E. Blanchard, . . .	1,000 00	Dale Bros. & Co., . . .	200 00
Misses Wells, . . .	600 00	J. H. Dix, . . .	100 00
Misses Wigglesworth, . . .	500 00	G. B. Blake, . . .	100 00
Hogg, Brown & Taylor, . . .	500 00	F. Bacon, . . .	100 00
Misses May, . . .	500 00	H. M. Clark, . . .	100 00
Mrs. John Legardner, . . .	500 00	S. D. Nickerson, . . .	100 00
P. C. Brooks, . . .	500 00	Rice, Kendall & Co., . . .	100 00
C. F. Hovey & Co., . . .	500 00	G. W. Wheelwright, . . .	100 00
T. G. Appleton, . . .	500 00	Wm. Minot, . . .	100 00
Caroline Merriam, . . .	500 00	H. D. Parker, . . .	100 00
N. Thayer, . . .	500 00	Samuel G. Howe, . . .	100 00
E. R. Mudge, . . .	500 00	Frederick Gray, . . .	100 00
J. C. Gray, . . .	300 00	Edward Motley, . . .	100 00
Amos A. Lawrence, . . .	300 00	W. D. Pickman, . . .	100 00
E. A. Foster, . . .	300 00	J. H. Walcott, . . .	100 00
James Parker, . . .	300 00	W. R. Robeson, . . .	100 00
S. Schlesinger, . . .	250 00	E. B. Bigelow, . . .	100 00
Thos. Wigglesworth, . . .	250 00	Mrs. Shimmin, . . .	100 00
Wm. Amory, . . .	250 00	Peter Parker, . . .	100 00
Edward Wigglesworth, . . .	250 00	Mrs. Sarah D. Tucker, . . .	100 00
Geo. O. Hovey, . . .	250 00	Sidney Homer, . . .	100 00
S. R. Payson, . . .	250 00	D. Denny, . . .	100 00
H. H. Hunnewell, . . .	250 00	Wheelwright, Pippey & Ander-	
M. Brimmer, . . .	250 00	son, . . .	100 00
Concert, Harvard Musical Club,	245 01	J. B. Glover, . . .	100 00
Mrs S. S. Russell, . . .	200 00	C. W. Galloupe, . . .	100 00
Kidder, Peabody & Co., . . .	200 00	Mary G. Chapman, . . .	100 00
Mary L. Shaw, . . .	200 00	John Pickett, . . .	100 00
W. L. Bullard, . . .	200 00	Mrs. Lodge, . . .	100 00
James Sturgis, . . .	200 00	Z. M. Crane, . . .	100 00
Theo. Lyman, . . .	200 00	J. M. Jones, . . .	100 00
Julia W. Howe, . . .	200 00	Otis Daniel, . . .	100 00
Mrs. A. G. Winthrop, . . .	200 00	S. G. Snelling, . . .	100 00
Samuel May, . . .	200 00	C. W. Freeland, Beard & Co.,	100 00
Abbott Lawrence, . . .	200 00	Joseph Ballard, . . .	100 00
Mrs. J. H. Walcott, . . .	200 00	Wm. Hilton & Co., . . .	100 00

Augustus Lowell, . . .	\$100 00	J. S. Ropes, . . .	\$50 00
Francis Brooks, . . .	100 00	F. L. Lowell, . . .	50 00
F. H. Bradlee, . . .	100 00	Turner Sargent, . . .	50 00
H. Saltonstall, . . .	100 00	W. W. Tucker, . . .	50 00
John H. Dix, . . .	100 00	Mrs C. A. Chase, . . .	50 00
Chas. E. Ware, . . .	100 00	Alanson Tucker, . . .	50 00
Mary Ann Wales, . . .	100 00	E. W. Hooper, . . .	50 00
G. W. Wales, . . .	100 00	J. W. Sever, . . .	50 00
J. B. Bailey, . . .	100 00	C. H. Dalton, . . .	50 00
W. Perkins, . . .	100 00	Stone & Downer, . . .	50 00
A Friend, . . .	100 00	Samuel Downer, . . .	50 00
R. W. Hooper, . . .	100 00	Geo. B. Upton, . . .	50 00
P. W. Chandler, . . .	100 00	C. W. Slack, . . .	25 00
Geo. Higginson, . . .	100 00	A. W. Stetson, . . .	25 00
Cummings & Sears, . . .	100 00	W. R. Alger, . . .	25 00
B. S. Rotch, . . .	100 00	James Reed, . . .	25 00
James Read, . . .	100 00	Hugh Montgomery, . . .	25 00
White, Brewer & Co., . . .	100 00	Benjamin Joy, . . .	25 00
B. W. Taggard, . . .	50 00	Joseph Iasigi, . . .	25 00
Mrs. B. W. Taggard, . . .	50 00	A Friend, . . .	5 00
Edward Austin, . . .	50 00		
S. W. Levett, . . .	50 00		
			<hr/>
			\$23,975 01

Account of Stock, October 1, 1870.

Real Estate,		\$252,230 00
Household Furniture,	\$17,315 00	
Provisions and Supplies on hand,	881 81	
Musical Department,	12,250 65	
Musical Library,	381 85	
Library of Books in common type,	961 10	
Library of Books in raised type,	13,760 50	
Furniture of Printing Office,	3,964 66	
Stereotype Plates,	1,923 00	
School Furniture and Apparatus,	2,479 65	
Boys' Shop,	292 03	
Stable, Horse, Wagons, &c.,	978 00	
One-half of Boat,	30 00	
Furniture and Stock at Workshop and Salesroom,	5,417 77	
		60,136 02
		<u>\$312,366 02</u>

*List of Embossed Books, printed at the Perkins Institution and
Massachusetts Asylum for the Blind.*

	No. of Vols.	Price per bound Vol. of those for sale.	Price per unbound Vol.
Lardner's Universal History,	3	\$5 00	\$2 50
Howe's Geography,	1	4 00	50
Howe's Atlas of the Islands,*	1	4 00	—
Howe's Blind Child's Manual,	1	—	—
Howe's Blind Child's First Book,*	1	2 50	—
Howe's Blind Child's Second Book,*	1	3 00	—
Howe's Blind Child's Third Book,*	1	3 00	—
Howe's Blind Child's Fourth Book,*	1	3 00	—
English Reader, first part,	1	—	—
English Reader, second part,*	1	4 00	—
English Grammar,	1	—	—
Viri Romæ,*	1	—	—
Pierce's Geometry, with diagrams,*	1	4 00	2 00
Political Class-Book,	1	—	—
First Table of Logarithms,	1	3 00	1 00
Second Table of Logarithms,	1	4 00	1 50
Principles of Arithmetic,	1.	—	—
Astronomical Dictionary,	1	3 00	—
Philosophy of Natural History,*	1	5 00	—
Rudiments of Natural Philosophy,*	1	5 00	2 00
Guyot's Geography,	1	5 00	2 50
Cyclopedia,	8	5 00	2 00
Book of Diagrams,	—	—	—
Natural Theology,	1	6 00	3 50
Combe's Constitution of Man,	1	6 00	3 50
Constitution of the United States,	1	—	—
Diderot's Essay,*	1	4 00	—
Baxter's Call,	1	4 00	1 00
Book of Proverbs,	1	4 00	1 00
Book of Psalms,	1	4 50	1 50
Psalms in Verse,	1	—	—
Psalms and Hymns,	1	—	—
New Testament (small),	4	4 00	2 00
New Testament (large),	2	—	—
Old Testament,	6	—	—
Bible,	—	—	—
Book of Common Prayer,	1	5 00	2 00
Hymns for the Blind,*	1	5 00	2 50
Guide to Devotion,	1	—	—
The Dairyman's Daughter,	1	—	—
Pilgrim's Progress,	1	4 00	1 00
The Spelling Book,	1	—	—
The Sixpenny Glass of Wine,	1	—	—
Harvey Boys,	1	—	—
Life of Melancthon,	1	3 00	1 00
Milton's Poetical Works,	2	—	—
Old Curiosity Shop,	3	5 00	2 50
Shakespeare's "Hamlet," & "Julius Cæsar,"	1	5 00	2 50
Writing Cards,			\$0 30
Braille's Writing Boards,			1 25

* Stereotyped.

LIST OF BLIND PEOPLE

AT PERKINS INSTITUTION AND MASS. ASYLUM FOR THE BLIND.

MASSACHUSETTS.

Alden, Lizzie.
 Batchelder, Belle.
 Beers, Nellie.
 Billings, Clara.
 Bubier, Jennie W.
 Capen, Martha.
 Connoley, Catherine.
 Day, Delia O.
 Doherty, Cassy.
 Downing, Katy.
 Fogg, Annie E.
 Garside, Lilla.
 Good Ellen.
 Healey, Julia V.
 Howland, Hannah H.
 Howland, Mary M.
 Jennison, Bella M.
 Jennison, H. E.
 Luke, Lizzie.
 McClaren, Mary J.
 Miles, Rosa.
 O'Hare, Mary A.
 Powers, Margaret.
 Robbins, M. C.
 Sampson, Sarah.
 Shaw, Ella.
 Smith, Lucy M.
 Sullivan, Julia.
 Tower, Minnie.
 Watson, Mary.

Briggs, Herbert.
 Carrol, Thomas.
 Cavanagh, James.
 Crafts, George.
 Cranston, William.
 Donnelley, Peter.
 Emerson, Frank.
 Goldthwaite, George.
 Gorman, Patrick.
 Hart, George.
 Heath, Frederick.
 Hennessey, Dennis.
 Howarth, William E.
 Jones, George.
 Lincoln, George.
 Mansfield, Andrew J.
 Marble, John N.
 McCanna, John.
 McDougal, William.
 Murphy, James.
 Parker, Benjamin F.
 Patterson, John H.
 Ramsdell, Herschel.
 Ryder, Clement.
 Thompson, George Wm.
 Wallace, William.

MAINE.

Ball, Flora E.
 Batchelder, J. Alice.
 Brann, Clara.
 Davis, Louisa.
 Healey, Abby.
 Robinson, Mittie.
 Shorey, Lydia.

Fish, Henry.
 Gowen, Frank.
 Greenleaf, Eugene.
 Libby, Charles.
 Murray, Arthur.
 Reed, Charles.
 Shaw, Charles.
 Stover, William L.

NEW HAMPSHIRE.

Blake, M. Annie.
 Bridgman, Laura D.
 Davis, Jennie A.
 McCaine, Emma.
 McCaine, Monisa.
 Smith, Martha A.

Russell, Herbert W.
 Sagar, William J.

VERMONT.

Cox, Olive.
 Keezar, Katie.
 Newell, Jennie.

Baker, Hubert.
 Gorman, Harry B.
 Hall, Henry A.
 Hoar, Morris.
 Kilbourne, Frank H.

CONNECTICUT.

Chapin, Anna.
 Martin, Mary.
 Spencer, Faith Ann.

Andrew, Arthur C.
 Barney, Charles.
 Crane, William A.
 Jewett, Frank E.
 Matthews, Orion C.
 Penny, Urban.
 Skinner, Arthur.
 Young, William.

RHODE ISLAND.

Brownell, Ella.
 Coughlin, Matilda.
 Kimball, Fannie C.
 Trafton, Idella.
 Woodmansie, Hattie A.
 Woodmansie, Mary E.

Fairman, De Volney.
 McElroy, Hugh.
 Pengally, John.
 Preston, Charles.
 Vars, John.

NEW YORK.

Harris, George.

CALIFORNIA.

Spencer, Charles Fred.

CANADA.

Kerston, Bertha.

Fraser, Septimus.

NOVA SCOTIA.

Fraser, Charles Fred.

TEACHERS.

Thomas Reeves.
 J. W. Smith.
 Freda Black.

Mary F. Knight.
 Fanny C. Moorman.

DOMESTICS.

Katie Flemming.
Direxia Hawkes.

Mary Barry.

TERMS OF ADMISSION.

Young blind persons, of good moral character, can be admitted to the school by paying \$300 per annum. This sum covers all expenses, except for clothing; namely, board, washing, medicines, the use of books, musical instruments, &c. The pupils must furnish their own clothing, and pay their own fares to and from the Institution. The friends of the pupils can visit them whenever they choose.

Indigent blind persons, of suitable age and character, belonging to Massachusetts, can be admitted gratuitously, by application to the governor for a warrant.

The following is a good form, though any other will do :

" To His Excellency the Governor :

“SIR,—My son (or daughter, or nephew, or niece, as the case may be), named A. B., and aged , cannot be instructed in the common schools for want of sight. I am unable to pay for the tuition at the Perkins Institution and Massachusetts Asylum for the Blind, and I request that your Excellency will give a warrant for free admission.

"Very respectfully, _____."

The application may be made by any relation or friend, if the parents are dead or absent.

It should be accompanied by a certificate from one or more of the selectmen of the town, or aldermen of the city, in this form:

"I hereby certify that, in my opinion, Mr. _____ is not a wealthy person, and that he cannot afford to pay \$300 per annum for his child's instruction. (Signed) _____."

There should also be a certificate, signed by some regular physician, in this form:

"I certify that, in my opinion, _____ has not sufficient vision to be taught in common schools; and that he is free from epilepsy, and from any contagious disease. (Signed) _____."

These papers should be done up together, and directed to "The Secretary of the Commonwealth, State House, Boston, Mass."

An obligation will be required from some responsible persons, that the pupil shall be removed without expense to the Institution, whenever it may be desirable to discharge him.

The usual period of tuition is from five to seven years.

Indigent blind persons residing in Maine, New Hampshire, Vermont, Connecticut and Rhode Island, by applying as above to the "Commissioners for the Blind, care of the Secretary of State," in the respective States, can obtain warrants of free admission.

For further particulars address Dr. S. G. Howe, Director of the Institution for the Blind, Boston, Mass.

The relatives or friends of the blind who may be sent to the Institution, are requested to furnish information in answer to the following questions:—

1. What is the name and age of the applicant?
2. Where born?
3. Was he born blind? If not, at what age was the sight impaired?
4. Is the blindness total or partial?
5. What is the supposed cause of the blindness?
6. Has he ever been subject to fits?
7. Is he now in good health and free from eruptions and contagious diseases of the skin?
8. Has he ever been to school? If yes, where?
9. What is the general moral character of the applicant?
10. Is he gentle and docile in temper, or the contrary?
11. Has he any peculiarity of temper and disposition?
12. Of what country was father of the applicant a native?
13. What was the general bodily condition and health of the father—was he vigorous and healthy, or the contrary?
14. Was the father of the applicant ever subject to fits or scrofula?
15. Were all his senses perfect?
16. Was he always a temperate man?
17. About how old was he when the applicant was born?
18. Was there any known peculiarity in the family of the father of the applicant; that is, were any of the grandparents, parents, uncles, aunts, brothers, sisters or cousins blind, deaf or insane, or afflicted with any infirmity of body or mind?
19. If dead, at what age did he die, and of what disorder?
20. Where was the mother of the applicant born?
21. What was the general bodily condition of the mother of the applicant—strong and healthy, or the contrary?
22. Was she ever subject to scrofula or to fits?
23. Were all her senses perfect?
24. Was she always a temperate woman?
25. About how old was she when the applicant was born?
26. How many children had she before the applicant was born?
27. Was she related by blood to her husband? if so, in what degree—1st, 2d or 3d cousins?

28. If dead, at what age did she die, and of what disorder?

29. Was there any known peculiarity in her family; that is, were any of her grandparents, parents, uncles, aunts, sisters, brothers, children or cousins either blind, or deaf or insane, or afflicted with any infirmity of body or mind?

30. What are the pecuniary means of the parents or immediate relatives of the applicant?

31. How much can they afford to pay towards the support and education of the applicant?

OFFICERS OF THE CORPORATION,
1870-71.

PRESIDENT.

MARTIN BRIMMER.

VICE-PRESIDENT.

JOSEPH LYMAN.

TREASURER.

WM. ENDICOTT, JR.

SECRETARY.

SAMUEL G. HOWE.

TRUSTEES.

ROBERT E. APTHORP.
FRANCIS BROOKS.
THOMAS T. BOUVÉ.
SAMUEL ELIOT.
GEORGE S. HALE.
AUGUSTUS LOWELL.

E. R. MUDGE.
EDWARD N. PERKINS.
JOSIAH QUINCY.
BENJAMIN S. ROTCH.
SAMUEL G. SNELLING.
JAMES STURGIS.

TWENTY-THIRD ANNUAL REPORT
OF
THE TRUSTEES
OF THE
MASSACHUSETTS SCHOOL
FOR
Idiotic and Feeble-Minded Youth.

OCTOBER, 1870.

BOSTON:
WRIGHT & POTTER, STATE PRINTERS,
79 MILK STREET (CORNER OF FEDERAL).
1871.

MASSACHUSETTS SCHOOL FOR IDIOTIC AND FEEBLE-MINDED YOUTH, }
BOSTON, December 8, 1870. }

Hon. OLIVER WARNER, *Secretary of State.*

SIR :—I have the honor to submit the Report of the Massachusetts School for Idiotic and Feeble-Minded Youth, to the Corporation and the Legislature, for the year ending September 30, 1870.

Respectfully,

SAM'L G. HOWE.

Commonwealth of Massachusetts.

TRUSTEES' REPORT.

MASSACHUSETTS SCHOOL FOR IDIOTIC AND FEEBLE-MINDED YOUTH, }
BOSTON, November 10, 1870. }

To the Corporation.

GENTLEMEN:—The undersigned Trustees respectfully submit the following Report for the year closing September 30, 1870:—

Whoever seeks knowledge of the nature, objects or condition of the institution, naturally looks for it in its annual reports. He cannot find it elsewhere. To meet this inquiry each report must be, to some extent, a repetition of former ones.

The general nature, intention and object of the institution may be stated as follows:

Our State adopts the policy of providing means of instruction for all who need it, and means of protection for all the poor who lack the faculty of guiding and supporting themselves. Under this policy, idiotic children have a double claim—to instruction and to protection.

First, to instruction. Whatever may be the nature of the germ of the soul, the idiot possesses at least that germ; but upon others, not upon himself, lies the responsibility for the degree of development it may receive in this stage of being.

Idiots possess the rudiments of all human attributes, especially the high attribute of educability. They are affected by culture even more than ordinary children and youth, because

the less the force of individual character, the greater its plasticity, and the more it is affected by extraneous influence.

A high and vigorous individuality possesses innate power of development, and fashions other things to itself; a common one has less force of development; it is more subject to outward influences, and the resultant character is the effect of education. But the weak and the idiotic lack the innate power of development; they have little or no individuality; they would merely grow as animals grow, were it not for outer influences, and these ought to be specially directed. In other words, ordinary children, even if neglected, will tumble up somehow into manhood, and probably into tolerable character, but the idiot, lacking the vital force of development, if neglected, remains in the mere animal condition.

Considering their low starting point, however, idiotic children can be made to progress nearly as far as ordinary children; but no reliance must be placed upon their innate power of development and improvement. Everything must be done for them.

The born idiot remains an idiot. Nobody expects to get him out of the class. But the trained and cultivated idiot differs from the one left uncultivated, as the gentleman differs from the boor. His lack of capacity for progressive self-development constitutes his claim, and our obligation. His need of all the culture he can get is sorer than that of any of the children of sorrow.

Such considerations demand at our hands for the idiot the privileges and advantages of instruction, which we so readily give to all children, whose need is great, indeed, but not so great as his.

Second. His right and his claim to protection and support at the hands of society.

In respect to their claims upon society, idiots may not improperly be classed among the chronic insane. They cannot, indeed, be called demented, for that implies that they once had sound mind; they are not deranged, for that would imply that they were once well ordered, mentally. But they are imperfect, unsound, *unsane*. Most of them are so from birth; probably from conception. A few lack the amount of mental light necessary for self-guidance as responsible human beings, apparently because the brain and nervous system are absolutely too small to

generate it. These are the *microcephales*, small-headed idiots. But the greater number lack the necessary light because the brain, by reason of original malformation, or abnormal development, or morbid condition of some of its component parts or of its adjuncts, cannot function harmoniously, that is, its various manifestations cannot be coördinated. Without such power of coördination the brain cannot be made to discourse reason, any more than a badly constructed organ can be made to discourse sweet music. In others there is a morbid activity in some part of the brain or its adjuncts, either organic or functional, which constitutes real insanity. All such children should be regarded as we regard the insane. They are the rising generation of this class ; and of course are the most impressible ; the most susceptible of change and improvement.

When they become of age, they become in some sense the wards of the State ; because, as a general rule, the rights and interests of an adult person, incapable of self-guidance, should not be committed to the hands of individuals, even of his kith and kin ; especially if he is heir to property. The State should educate those who are destined to be its wards, and protect them after they have become so.

Such are the general *a priori* considerations which led to the creation of this institution ; and the results of twenty-one years' experience prove that they were sound, and, [as has been before said,] that the establishment is grounded on sound sociological principles ; that it is doing a work of real beneficence ; and that it is as free from objections and drawbacks as any establishment carried on by coöperative benevolence can be.

Most of the objections brought by sound political economists and wise sociologists against legalized public charities, whether supported by taxation or organized and maintained by societies which depute the work of administration to paid officials, either fail entirely against this institution, or are deprived of most of their force.

It does not, like too many public charities, tend to dry up the sources of private charity, but increases them by bringing under closer observation and personal attention, and presenting in an agreeable aspect so many who, if left unaided, are apt to become objects of aversion and disgust to all but blood relations.

It does not lessen the feeling of obligation on the part of relatives, friends and neighbors, towards the unfortunate object of its care, but rather increases that feeling by showing that the task of raising and improving the least of the little ones is not beyond the strength of the arm of charity.

It does not in any way act as a premium on the increase of the numbers of the objects of its care, for, though its buildings were palaces, and its inmates were gorgeously clad and luxuriously fed, no parent would the less dread having an idiotic child, or guard less against the causes which reduce children to idiocy.

It does not deserve the common objection against congregating and associating together defectives of certain classes, that such association intensifies in them the evil growing out of their defect, or that it segregates them from the community, and creates a spirit of caste.

There is little danger of any being thrust in who can be harmed by association with the inmates.

It would have been hard even for the philosophic Chalmers, whose keen insight showed the unsound and vicious principles of the poor-law system of England, and who pointed out the practical evils which so diminish the amount of good done by public charities—it would have been hard even for him, had a school for idiots been thought of in his day, to have brought any valid objections against it.

On the other hand, while the institution is free from so many of the disadvantages and drawbacks which lessen the efficiency and the practical beneficence of many kindred establishments, it combines within itself the advantages of all of them.

Its existence implies faith in God, trust in humanity, and obedience to Jesus Christ. Faith that God endowed all his creatures with the capacity for improvement and upward growth; trust in human power to develop and favor that growth; obedience to Christ, who forbade hiding even a poor, single talent in a napkin, and commanded us to do for the least favored ones of our kind what we would do even unto him.

The annual grant from the State treasury enables the Trustees to open the doors of the institution to all idiotic children belonging in Massachusetts whose parents are indigent. A

small charge is made to those who have property. Very few of the applicants however feel that they can afford to pay anything.

It seems probable that idiots are more numerous among the children of the rich and of the poor than of the middling class, who suffer neither the enervation of riches nor the pinching of poverty. Many such children appear like abortions of nature, caused by inactive and luxurious, or of over-active and poorly-nourished lives of parents. Be this as it may, the pupils of our school come mainly from the actually poor. Many are of families that have been deteriorating physically ; and are nearly run out. The stock has become vitiated by various causes ; among which, intemperance, and physical excesses, are prominent.

The offspring are scrofulous and feeble ; and grow more so in each successive generation. Their feebleness keeps them backward in the race of life. In spite of their struggles they tend toward poverty and want ; and can barely keep out of the dependent class. When to such a family is born a child who, instead of a help, is to be a perpetual burden ; instead of a blessing, is a calamity, the consequences are apt to be utter discouragement and final dependence. To such families the aid of the State comes timely ; and comes in a form which is not humiliating, but, on the contrary, is grateful and encouraging. A child beloved by them, but loathed, or at least pitied by their neighbors ; avoided by other children ; shut out from the common school ; kept away from church and Sabbath school ; hidden from visitors ; a constant care and sorrow to the mother ; a source of anxious forethought to the father,—such a child is taken up by the strong arms of the State, and nourished, and trained and taught, so that its single, little talent may be developed to the utmost.

In some cases the conduct of such parents is interesting and touching. They try to put a brave face upon the matter. The mother shrinks from admitting that her darling is idiotic. She thinks it is only peculiar. It cannot talk to other people, but she can understand it. It seems foolish to other people, but she knows it is bright. It cannot walk, nor use its limbs freely ; but that is only a bodily weakness ; and has nothing to do with the brain, or mind, &c. Finally, whatever may be the case now, she insists that the poor child was bright at birth ; and if it is

short-coming or foolish, it must be the result of some accident or impediment ; and that a little special schooling and care will bring it out all right by and by. The father does not want to be considered as accepting State's aid ; he will pay the board, or part of it ; and he means to do so. Perhaps he does pay for a time ; but soon he finds that his family expenses absorb all his earnings ; and the charges against him are generally carried to the account which has but one side in our ledger—the account of profit and loss.

The only pupils who pay the full charge of \$300 are from without the State.

Wealthy persons procure special attendants and instruction for their children ; or send them to the large, flourishing and excellent school at Barre ; or to some establishment beyond the borders of the State.*

Our pupils, whether State beneficiaries or private pupils, are treated alike. They are well and comfortably clad, housed and lodged. They have abundance of nourishing food, and are kept scrupulously clean. They are taught daily in school and in the workshop. They are subject to gentle and kind discipline, and never made to suffer any corporal pain for any offence whatever ; it being well understood that an attendant will be instantly dismissed who even pulls an ear, or inflicts any painful discipline.

The pupils pass from five to seven years in this way ; and, by force of custom, become docile, industrious, and regular in their habits. They govern their appetites ; strive to obtain approbation ; and learn to reciprocate kind feeling expressed toward them. Kept scrupulously clean by frequent bathing, they learn to prefer cleanliness to filth. Tidily dressed and neatly served at table, they acquire habits of propriety and good demeanor. The girls are exercised daily in such housework or handiwork as they can manage. The boys work daily in the shop, and some of them do very well at simple trades, like broom-making.

* A new private school, intended for only a few pupils, has been lately opened at Fayville, Mass., by Miss Dana and Mrs. Knight, two ladies formerly teachers in this institution. They have a pleasant little Home in a charming neighborhood, which merits the attention of any persons who desire to place children of this class.

The effect of five or seven years, of the most impressionable period of life, passed under such influences cannot fail to be good.

There is a marked improvement in all cases, except there be active disease ; and the improvement is of a kind which will probably be seen in their whole lives. It is still so seen in many who left us years ago.

Such is a general description of the establishment.

The number of inmates reported last year was eighty-seven ; twenty-six have entered ; thirty have been discharged ; so that the present number is eighty-three.

The quarterly reports of the Superintendent have given the details of the condition of the establishment. They will be summed up in a special report. The report of the Treasurer sets forth the favorable condition of the finances. The surplus, however, will be used as soon as it is large enough to pay for some much-needed improvements.

The several inventories required by law are herewith submitted.

Respectfully,

LEWIS ALLEN.
JOSIAH BARTLETT.
FRANCIS W. BIRD.
JAMES B. CONGDON.
HENRY G. DENNY.
JOHN FLINT.
SAM'L G. HOWE.
EDWARD JARVIS.
EDWIN MORTON.
ROBT. B. STORER.
EMORY WASHBURN.

1899. Oct. 1,	For balance from former account,	\$476 95	1899. Oct. - ,	By repayment of loan, stamp and interest thereon,	\$500 00 1 58
1899. Jan. - ,	For gifts for children's Christmas received in December from Miss Worcester, \$2; Miss Lord, \$5, and Mr. Conding, 50 cents,	7 50	1899. Sept 30,	By Auditor's drafts paid at sundry dates, rent of safe, \$10, stamps, \$1, increase of "Fairbanks Legacy," increase of "Harris Fund," increase of "Miss Josephine May Gift," balance on hand and carried down,	20,000 00 11 00 28 40 800 00 17 50 2,993 08
1899. Sept. 30,	treasury, balance of build- ing, treasury at sundry dates, rent expenses, and education from sundry year, interest received, sales of sundries, income of "Stephen Fairbanks Legacy," income of "Henry Harris Fund," income of "Miss Josephine May Gift,"	2,177 44 16,500 00 4,129 51 186 84 28 42 28 40 800 00 17 50			
		\$23,851 56			\$23,851 56
1899. Oct. 1,	For balance brought down,	\$2,993 08			

(E. & O. E.)

FRED. W. G. MAY, Treasurer.

Boston, October 22, 1870.

I have examined the foregoing account, and find the same correctly cast and properly vouched.

The Treasurer has also exhibited to me the following evidences of property, viz.:—

STEPHEN FAIRBANKS FUND.

United States 10-40 Bond,	\$500 00	
Bank Book, Five Cent Savings Bank,	130 14	
	<hr/>	\$630 14

HENRY HARRIS FUND.

State of Massachusetts 6 per cent. Currency Bonds,	\$2,000 00	
City of Boston 6 per cent. Currency Bonds,	3,000 00	
Bank Book, Five Cent Savings Bank,	53 34	
“ “ Provident Institution for Savings,	600 00	
	<hr/>	\$5,653 34

JOSEPHINE MAY FUND.

Vermont and Massachusetts Railroad 7 per cent.		
Bond,	\$500 00	
Bank Book, Five Cent Savings Bank,	35 53	
	<hr/>	\$535 53

ROBT. B. STORER, *Auditor.*

FREDERICK W. G. MAY, *Trustee of "HENRY HARRIS FUND," in account.*

1869.

Oct. 1 Trustee charged himself with the then value of this fund, \$5,353 34

1870.

Sept. 30	And now charges himself with		
	Coupons paid on \$2,000 Massachusetts		
	Currency Bonds, 6 per cent., . . .	\$120 00	
	Coupons paid on \$3,000 City of Boston		
	Bonds, 6 per cent.,	180 00	
		<u>300 00</u>	
	Which sums have been paid into Provident Institution		
	for Savings, &c.		<u>\$5,653 34</u>

(E. E.)

FRED. W. G. MAY, *Trustee.*

FREDERICK W. G. MAY, *Trustee of "MISS JOSEPHINE MAY GIFT," in account.*

1869.

Oct. 1. Trustee charged himself with the then value of this gift, \$518 03

1870.

July 7.	And now with July coupon on \$500 Bond paid, . . .	17 50
	Which sum has been deposited in Five Cent Savings	
	Bank.	<u>17 50</u>
	Value of "Miss Josephine May Gift" on October 1, 1870, .	\$535 53

(E. E.)

FRED. W. G. MAY, *Trustee.*

FREDERICK W. G. MAY, *Trustee of "STEPHEN FAIRBANKS LEGACY," in account.*

1869.

Oct. 5. Trustee charged himself with the then value of this
legacy, \$601 74

1870.

Sept. 30.	And now charges himself with 1870 Coupons \$25.00,	
	paid in gold, and premium \$3.40,	28 40
	Which sum has been deposited in Five Cent Savings	
	Bank.	<u>28 40</u>
		\$630 14

(E. E.)

FRED. W. G. MAY, *Trustee.*

Boston, Oct. 22, 1870. I have examined the foregoing accounts, and find the same correctly cast and properly vouched.

ROBT. B. STORER, *Auditor.*

*General Analysis of Expenditures for the year ending
September 30, 1870, as per Steward's Account.*

Meat,	\$1,453 22	
Fish,	292 71	
Butter,	571 93	
Rice, sago, &c.,	147 16	
Bread, flour, meal, &c.,	1,405 54	
Potatoes and other vegetables,	291 89	
Fruit,	72 11	
Milk,	483 56	
Sugar,	374 33	
Tea and coffee,	141 77	
Sundry groceries,	267 66	
Sundry articles of consumption,	208 02	
Gas and oil,	43 32	
Coal and wood,	1,921 91	
Washing,	332 21	
Furniture and bedding,	942 42	
Clothing and mending,	29 05	
Superintendence and instruction,	1,654 70	
Domestic service,	2,489 15	
Outside aid,	187 13	
Expenses of boys' shop,	94 97	
Expenses of stable,	708 94	
Books and stationery,	154 85	
Medicine and medical aid,	29 10	
Rent of land,	20 00	
Insurance,	500 00	
Musical instruments,	5 00	
Travelling and other expenses of Superintendent,	500 00	
Sundries,	213 78	
Ordinary construction and repairs,	3,558 70	
		\$19,045 13
Extraordinary construction and repairs,	\$115 86	
Proportion of expense for extension of gas pipes,	104 50	
Piano,	385 00	
Cow and poultry,	185 00	
Plants, &c.,	114 82	
Bills to be refunded,	911 03	
		1,816 21
		<u>\$20,861 34</u>

Account of Stock, October 1, 1870.

Land and buildings between Eighth and Ninth, and M and N- Streets, South Boston,	\$70,000 00
Household furniture,	3,630 10
School furniture and apparatus	800 82
Library,	125 00
Pianos,	630 00
Furniture of laundry,	48 75
Provisions,	199 61
Boys' shop,	210 10
Stable and cellar furniture, carriage, &c.,	395 57
Caloric engine,	45 00
Coal, forty tons,	280 00
One-half of boat,	30 00
	<hr/>
	\$75,894 95

TERMS OF ADMISSION, &c.

The best age for admission is between six and twelve years.

The institution is not intended for epileptic or furiously insane children, nor for those who are incurably hydrocephalic or paralytic. None such will be retained, to the exclusion of more improvable subjects.

Children will be received upon trial for one month, at the end of which time a report upon the case will be made to the parents.

Children must come well provided with plain, strong clothing, and stout shoes for walking in any weather. They must be renewed as often as is necessary, at the expense of the applicants. Those who tear and destroy their clothing must be provided with garments made expressly for them, and of such form and texture as not to be easily torn.

Sufficient surety will be required for the clothing of the pupils, for their board and care in vacation, and for their removal whenever they may be discharged.

The children of indigent parents in Massachusetts can secure gratuitous admission by application to the Governor.* For others a small charge will be made proportionate to the means of the parents, and the trouble and cost of treating them.

Persons applying for the admission of children as beneficiaries of Massachusetts must fill out certain blanks, the form of which is as follows:

FORM OF APPLICATION FOR BENEFICIARIES IN MASSACHUSETTS.

18 .

To His Excellency, the Governor :—

SIR,—The undersigned, citizen of Massachusetts, and inhabitant of the town of _____, respectfully represents that his son [or daughter],† named _____, and aged _____ years, is so deficient in intellect that he cannot be taught in the common schools, as other youth are; and he therefore requests that your Excellency would recommend him for admission as a pupil to the Massachusetts School for teaching and training Idiotic and Feeble-Minded Persons, as a State beneficiary.

Respectfully yours, _____.

The application should be accompanied by two certificates, in the following form:—

* The same applies to the other New England States.

† If a town pauper, the overseers of the poor may apply as for their ward.

I.

18 .

I, _____, one of the selectmen of the town of _____, hereby certify, that, in my opinion, _____ is not wealthy, and could not well afford to pay \$300 per year for the instruction of _____ at the School for Idiotic and Feeble-Minded Persons.

(Signed,) _____.

II.

18 .

I, _____, citizen of Massachusetts, physician, and practitioner in the town of _____, hereby certify, that I have examined _____ and find that he is not insane, but is so deficient in mental ability that he cannot be taught in the common schools, as others of his age are.

His bodily health is _____, and he has no cutaneous or contagious disorder.

(Signed,) _____.

N. B. The physician is earnestly requested to state, in writing, his opinion of the *cause* of the person's mental deficiency; to state whether he is or has been epileptic; also, to mention any organic or functional peculiarity that he may have observed. It may be greatly for the advantage of the person, that the physician should send in writing a full and minute account of the case, with his own thoughts and suggestions in regard to it.

If the applicant is admitted as a beneficiary, he must be provided with a paper signed by two responsible persons, in form of a guaranty for removal, as follows:—

We, the undersigned, citizens of Massachusetts, and householders in the town of _____, respectfully pledge ourselves, that, should _____ be received into the Massachusetts School for teaching and training Idiotic and Feeble-Minded Youth, he shall be kept properly supplied with decent clothing, that he shall be removed during vacations, (if his removal be required,) and that, whenever he shall be discharged, he shall be removed at once, and the institution relieved from all responsibility for his support.

(Signed,) _____.

For private pupils the following bond is required to be signed by two responsible persons, one of whom shall be known to the trustees:—

In consideration of _____ being admitted a pupil into the Massachusetts School for Idiotic and Feeble-Minded Youth, at our request, we, the undersigned, jointly and severally promise the said School to pay the Superintendent thereof, at said School, quarterly in advance, on the first days of January, April, July and October, the rate of board and tuition which may from time to time be determined by the Trustees of said School for said pupil,

to provide or pay for all requisite clothing and other things necessary or proper for the health and comfort of said pupil, to pay for all proper expenses incurred for the return of said pupil to the School in case of elopement, to pay for support of said pupil in vacation, to remove said pupil when discharged, to re-imburse funeral expenses in case of death, and if removed against the advice and consent of the Superintendent before the expiration of three calendar months, to pay board for thirteen weeks.

For further particulars, address Dr. S. G. Howe, 20 Bromfield Street, Boston.

QUESTIONS TO BE ANSWERED

By the Parents or Friends of Applicants for Admission to the School.

1. What is the applicant's name and age?
2. Where was he [or she] born?
3. Was the birth at the full period of gestation?
4. Were there any extraordinary circumstances attendant upon the delivery? If so, describe them.
5. What has been the general health and the bodily condition of the applicant?
6. At what period was it first observed that there was any thing peculiar about the applicant?
7. Has there been observed, at any time since birth, any thing peculiar in the shape or condition of the head?
8. Does the head now differ in shape or condition from the head of an ordinary person of the same age?
9. What is now the general health of the applicant?
10. Is he [or she] now subject, or has he [or she] ever been subject, to epilepsy, or fits of any kind?
11. Describe the fits, if any.
12. What is now the applicant's weight?
13. What is now the applicant's height?
14. Is there any infirmity of body, or any striking peculiarity?
15. How is the appetite for food and drink?
16. Is the applicant active and vigorous? Does he [or she] run about and notice things, or the contrary?
17. What is the state of the sense of sight? Is the eye bright or dull?
18. What is the state of the sense of hearing? Is it quick or sluggish?
19. Does the applicant show any sensibility to musical sounds?
20. What is the state of the sense of smell?
21. What is the state of the sense of taste? Is he [or she] particular about what he [or she] eats? or will he [or she] swallow things, without regard to taste?

22. Is he [or she] gluttonous?
23. What are the habits with regard to personal cleanliness?
24. Can he [or she] talk?—that is, make a regular sentence, containing nouns, verbs, adjectives, and adverbs, &c.?
25. Does he [or she] use understandingly such words as *or* and *if*?
26. Please give several specimens of the mode of talking, and be careful to put down the words exactly as he [or she] uses them.
27. Can he [or she] dress and undress without help?
28. Can he [or she] feed without help?
29. Does he [or she] use a spoon, or knife and fork?
30. Can he [or she] tie his [or her] shoe-strings in a regular knot?
31. Can he [or she] do any work? and what kind?
32. What are his [or her] personal habits?
33. Does he [or she] hide, break, or destroy things?
34. Does he [or she] get up in the night, and wander about?
35. Is he [or she] obedient?
36. Does he [or she] come when called?
37. Does he [or she] go astray?
38. Is he [or she] passionate?
39. Is he [or she] given to self-abuse, or masturbation?
40. Has there been such watchfulness, that you can be sure the applicant is free from all habits of self-pollution?
41. Please state any facts that may show the peculiar character of the applicant.
42. Of what country was the father of the applicant a native?
43. What was the general bodily condition and health of the father? Was he vigorous and healthy, or the contrary?
44. Was the father of the applicant scrofulous, or was he subject to fits?
45. Were all his senses perfect?
46. Was he always a temperate man?
47. About how old was he when the applicant was born?
48. Was there any known peculiarity in the family of the father of the applicant?—that is, were any of the grand-parents, parents, uncles, aunts, brothers, sisters, or cousins, blind, deaf, or insane, or afflicted with any infirmity of body or mind?
49. If dead, at what age did the father die, and of what disorder?
50. Where was the mother of the applicant born?
51. What was the general bodily condition of the mother of the applicant?—strong and healthy, or the contrary?
52. Was she scrofulous, or ever subject to fits?
53. Were all her senses perfect?
54. Was she always a temperate woman?
55. About how old was she when the applicant was born?
56. How many children had she before the applicant was born?
57. Was there any thing peculiar in the bodily or mental condition of the other children?
58. What was the state of the mother's health during the time she was pregnant with the applicant?

59. Was she subject to any bodily injury or severe sickness, or to any extraordinary mental emotion or fright, great sorrow, or the like?

60. Was she related by blood to her husband? If so, in what degree—first, second, or third cousins?

61. If dead, at what age did she die, and of what disorder?

62. Was there any known peculiarity in her family?—that is, were any of her grand-parents, parents, uncles, aunts, sisters, brothers, children, or cousins, either blind or deaf or insane, or afflicted with any infirmity of body or mind?

63. What are the pecuniary means of the parents or immediate relatives of the applicant?

64. How much can they afford to pay towards the support and education of the applicant?

65. What are the names of the father and mother?

66. What is their residence?

67. What is the post-office address of the parents or other responsible friends?

PUBLIC DOCUMENT No. 29.

Commonwealth of Massachusetts.

A N N U A L R E P O R T

OF THE

GUARDIAN

OF THE

CHAPPEQUIDDIC AND CHRISTIANTOWN INDIANS.

AUGUST 27, 1870.

PUBLIC DOCUMENT No. 30.

Commonwealth of Massachusetts.

To His Excellency the Governor and the Honorable Council.

An Act of the Legislature approved June 23d, 1869, provides that the Board of State Charities shall make provisions in the State almshouses, or elsewhere, for the support of any persons heretofore known as Indians, who may be unable to support themselves, and who have not acquired a settlement in any town.

By virtue of this authority, the board expended during the quarter ending December 31st, 1869, on account of the Dudley tribe of Indians, for supplies, such as groceries and fuel, one hundred and seventeen and $\frac{15}{100}$ dollars (\$117.15).

No supplies have been furnished since that date, but the overseers of the poor of the town of Webster have been authorized, for a limited time, to expend a sum not exceeding one dollar per week, for the support of Mrs. Hull, a member of this tribe, the same to be reimbursed from the Commonwealth's treasury.

By the Act before mentioned, the board were further authorized to sell at public auction the house in Webster belonging to the Commonwealth, then occupied by this tribe of Indians.

The house was sold in August last, and the proceeds thereof, amounting to seventeen hundred and ninety dollars (\$1,790), has been paid into the treasury of the Commonwealth.

In accordance with an agreement made at the time of sale, the Indians occupying the premises were removed to the town

of Dudley, and there furnished with proper shelter accommodations, the rent to be paid by the Commonwealth until the first of January, 1871.

The expenses attending the sale and removal amounted to forty-seven and $\frac{50}{100}$ dollars, which has been paid from the appropriation of 1870.

For the Board,

SAM'L G. HOWE, *Chairman.*

Boston, October 1, 1870.

PUBLIC DOCUMENT No. 31.

Commonwealth of Massachusetts.

To His Excellency WILLIAM CLAFLIN, and the Honorable
Executive Council.

THE ACCOUNT OF E. S. WHITTEMORE, TREASURER OF THE HERRING
POND PLANTATION.

I herewith submit my Report of the financial condition of
the Indians of Herring Pond Plantation, for the year ending
September 30, 1870.

1870. DISBURSEMENTS.

<i>Feb.</i>	22.	Paid Rev. G. Carpenter for supplying pulpit two Sabbaths,	\$12 00
<i>May</i>	2.	Paid Ellen F. Hirsch for teaching school,	3 90
	9.	Paid expenses of conveyance of the Stur- gis property,	5 00
		My services one year,	60 00
			<hr/>
			\$80 90

1870.	CONTRA.		CR.
<i>Oct.</i>	1.	By balance in settlement,	\$2,269 55
		By income to October 1, 1870,	94 39
			<hr/>
			\$2,363 94

Of the foregoing \$2,363.94 credit, \$498.87 of the same is represented in a house and lot of land on which it stands, known as the Sturgis property, at Cotoit Port, which came into my hands as a part of the property at the time I came into office, \$498 87

Leaving a cash balance of, \$1,865 07

E. S. WHITTEMORE,
Treasurer of the Herring Pond Indians.

SANDWICH, September 30, 1870.

PUBLIC DOCUMENT....No. 32.

Commonwealth of Massachusetts.

To His Excellency the Governor and the Honorable Council.

The subscriber having been, under an Act of April 27, 1863, chosen Treasurer of the District of Marshpee, reports, agreeably to an Act of April 23, 1853, the state of the treasury and affairs of the District.

*District of Marshpee in account with S. C. HOWLAND,
Treasurer.*

1869.	DR.
October 1.	
To balance of last account, September 30, 1869, .	\$470 87
paid Matthias Amos, for State pauper, . . .	12 00
William H. Simon, services, . . .	10 50
John W. Pope, for coffin, . . .	12 00
George R. Coombs, collector of taxes, .	10 00
J. Tobias, roads, \$4.39; N. S. Pocknet, roads, \$6.60,	10 99
Benjamin J. Attaquin, clerk services, .	10 00
David Lovell, school,	6 80
J. Pompey, for roads,	4 43
O. Jones, for roads,	1 29
M. F. Handy, teaching school, . . .	50 00
George T. Ockery, for roads, . . .	3 93
Lisbon Johnson, boarding teacher, . .	17 50
William Mye, for roads,	2 17
M. F. Delano, medical services, . . .	16 00

To paid Samuel Nickerson, shoes for F. Jackson, .	\$2 00
Zenas Ewer, for stove,	4 75
Walter R. Mingo, for roads,	5 60
Edwin Jones, school, \$2 ; Lisbon Johnson, schools, \$14,	16 00
Asa F. Bearse, supplies for poor,	24 00
Town of Barnstable, for bridge,	80 00
W. T. Hammond, labor on roads and ser- vices,	35 16
William H. Simon, labor on roads and services,	23 92
M. Woods, teaching school, \$26 ; V. N. Hatch, \$15,	41 00
Matthias Amos, State pauper account,	17 00
John Young, for roads,	60
Daniel Nickerson, supplies to poor,	7 97
Timothy Pocknet, for State pauper,	24 00
G. T. Ockery, for poor,	26 00
J. R. Nickles, Jr., printing,	15 00
Hall & Whittemore, school books,	22 47
Matthias Amos, abatement of taxes,	19 15
Matthias Amos, for land taken for taxes,	20 12
William Mye, for State pauper,	8 00
John Pompey, fish agent,	4 00
J. Coet, for roads,	5 21
Jacob Pocknet, warrants, &c.,	4 59
Henry Lovell, work on school-house,	2 80
Charles L. Baxter, work on school-house,	6 50
William H. Simon, for meeting-house,	5 00
William H. Simon, for services,	22 74
Roland T. Harlow, for roads,	1 25
Lisbon Johnson, boarding teacher,	15 50
Mary Woods, teaching school,	65 00
E. O. Luce, teaching school,	140 00
Watson F. Hammond, teaching school,	8 65
Matthias Amos, balance of collector's ac- count,	3 27
S. C. Howland, treasurer, and sundries,	138 75
	<hr/>
	\$1,404 48

1869.	CONTRA.	CR.
<i>December.</i>		
By cash of Sandwich, for school, V. B.		
Collins,		\$24 00
of David Lovell, for school, .		13 00

1870.
January.

By cash of S. H. Fessenden, lease to		
January 1, 1871,	\$400	00
of Commonwealth, for schools,	265	00
of William Swift, towards wood,	4	27
of county treasurer, for dog		
licenses,	45	48
of A. Phinney, lease of beach,	5	00
towards marsh hire,	43	17
of George R. Coombs, collector,	89	58
of M. Amos, collector,	52	38
of M. Amos, collector, balance	•	
in full,	101	10
		<hr/> \$1,042 98
By balance due Treasurer,		<hr/> \$361 50

S. C. HOWLAND,
Treasurer of Marshpee.

SOUTH SANDWICH, March, 1870.

MARSHPEE, March, 1870. We, the Selectmen of the District of Marshpee, hereby certify that we have examined the foregoing account of the Treasurer, and the vouchers supporting the same, and are satisfied that it is correct, and hereby declare our approval of the same.

WATSON F. HAMMOND.
WILLIAM H. SIMON.

PUBLIC DOCUMENT No. 33.

Commonwealth of Massachusetts.

The Account of John W. Bacon, Guardian of the Natick Indians, rendered to His Excellency the Governor, and the Honorable Council, for the year ending September 30, 1870.

The said Guardian charges himself with the balance remaining in his hands on settlement of his last annual account, for the year ending September 30, 1869, . . . \$1,111 49
And interest thereon for one year, . . . 66 69

\$1,178 18

And asks to be allowed for the following sums of money expended for said Indians, and for his charges, to wit:—

February 3, 1870. Paid Elizabeth Brown, \$10 00
July 13, 1870. Paid Patience Blodgett, . 20 00
For services rendering account, &c., . 10 00

40 00

Balance remaining in hands of Guardian, . \$1,138 18

JOHN W. BACON,
Guardian.

MIDDLESEX, ss., October 15, 1870. Then personally appeared the above named John W. Bacon, and made oath that the foregoing account by him exhibited, is in all respects just and true.

Before me, GEORGE L. SLEEPER, *Justice of the Peace.*

Approved. WILLIAM A. RICHARDSON, *Judge of Probate Court.*

PUBLIC DOCUMENT No. 34.

Commonwealth of Massachusetts.

To His Excellency the Governor and the Honorable Council.

An Act of the legislature, approved June 23, 1869, provides that the Board of State Charities shall make provisions in the State almshouses, or elsewhere, for the support of any persons heretofore known as Indians, who may be unable to support themselves, and who have not acquired a settlement in any town.

But a single application for aid has been made by any member of the Troy tribe of Indians.

Mrs. Mingo, a woman advanced in years, has personally applied for assistance, which application will probably be renewed during the coming winter. No disbursements to any member of this tribe have as yet been made.

For the Board,

SAM'L G. HOWE, *Chairman.*

Boston, October 1, 1870.

PUBLIC DOCUMENT.....

.....No. 35.

SECOND ANNUAL REPORT

OF THE

BOARD OF RAILROAD COMMISSIONERS.

JANUARY, 1871.

BOSTON:

**WRIGHT & POTTER, STATE PRINTERS, No. 79 MILK STREET,
(CORNER OF FEDERAL STREET).**

1871.

CONTENTS.

	PAGE.
GENERAL REPORT,	v
APPENDIX:	
A. Inspection of Railroads,	lxxii
B. Condensed statement of progress of new railroads,	lxxxix
C. Proposed General Railroad Law,	lxxxiv
D. Tabular statement of municipal aid to railroads,	lxxxix
E. New forms of railroad returns,	xcix
F. Proposed modification of law relative to tools on railroad trains,	cviii
G. Proposed law relative to safety switches,	cix
H. Proposed law relative to <i>pro rata</i> freights,	cx
I. <i>Reports on Petitions and Complaints:</i>	
Petition of Fitchburg Railroad Company for fixing compensation to be paid by Boston, Clinton & Fitchburg Railroad Company for use of railroad, &c.,	cxi
Complaint of Selectmen of Wareham on petition of C. F. A. Weston and others concerning freight on cord-wood on the Cape Cod Railroad,	cxiii
Complaint of Selectmen of Wareham relative to a dangerous crossing of the Cape Cod Railroad,	cxiv
Complaint of the Selectmen of Freetown on the petition of Paul M. Burns and others against the New Bedford & Taunton Railroad Company,	cxv
Hearing in the matter of the re-location of the depot of the Providence & Worcester Railroad in Millbury,	cxx
K. Tabular abstract of accidents reported to the Board,	cxxiv
L. Proposed law to regulate the transportation of nitro-glycerine and other explosives,	cxxix
M. Statement of expenses of the Board,	cxxxix

INDEX TO REPORTS OF RAILROAD COMPANIES.

RAILROAD RETURNS.

	Page.		Page.
Athol and Enfield,	2	Mansfield and Framingham,	95
Berkshire,	208	Massachusetts Central,	100
Boston and Albany,	4	Middleborough and Taunton,	102
Boston, Barre and Gardner,	11	Milford and Woonsocket,	107
Boston, Clinton and Fitchburg,	14	Monadnock,	235
Boston, Hartford and Erle,	242	Nashua and Lowell,	112
Boston and Lowell,	213	New Bedford and Taunton,	118
Boston and Maine,	22	Newburyport,	127
Boston and Providence,	29	New Haven and Northampton,	130
Cape Cod,	35	New London Northern,	136
Cheshire,	40	Norwich and Worcester,	246
Connecticut River,	46	Old Colony and Newport,	142
Danvers,	52	Pittsfield and North Adams,	148
Dorchester and Milton,	55	Providence and Worcester,	151
Duxbury and Cohasset,	60	Salem and Lowell,	158
Eastern,	61	South Reading Branch,	163
Easton Branch,	219	South Shore,	168
Fairhaven Branch,	122	Stockbridge and Pittsfield,	237
Fall River, Warren and Providence,	69	Stony Brook,	175
Fitchburg,	224	Stoughton Branch,	181
Framingham and Lowell,	76	Taunton Branch,	186
Hanover Branch,	77	Vermont and Massachusetts,	191
Hartford and New Haven,	230	Ware River,	197
Horn Pond Branch,	83	West Stockbridge,	199
Lowell and Lawrence,	89	Worcester and Nashua,	202

STREET RAILWAY RETURNS.

	Page.		Page.
Albany Street Freight,	254	Northampton and Williamsburg,	289
Boston and Chelsea,	257	North Woburn Street,	292
Boston and West Roxbury,	323	Salem,	295
Cambridge,	260	Somerville Horse,	298
Lowell Horse,	263	South Boston,	301
Lynn and Boston,	266	Springfield,	305
Malden and Melrose,	270	Stoneham Street,	308
Marginal Freight,	273	Union,	311
Medford and Charlestown,	276	Waltham and Newton,	314
Merrimack Valley Horse,	279	Winnisimmet,	317
Metropolitan,	282	Worcester,	320
Middlesex,	286		

ABSTRACT of Railroad Returns,	327
ABSTRACT of Street Railway Returns,	328
APPENDIX: Lease of Mansfield and Framingham Railroad to the Boston, Clinton and Fitchburg R. R. Co.,	329

Commonwealth of Massachusetts.

The Railroad Commissioners respectfully submit their Second Annual Report.

The subjects which the commissioners feel called upon to discuss in this, their second annual report, naturally divide themselves under two heads :—

1st. Those matters peculiar to this Commonwealth, or which by special order of the last legislature were referred to this board with instructions to report thereon, being rather of a local or temporary description ; and

2d. The general questions of railroad development, which are now subjects of inquiry here, no less than elsewhere, and which arise out of the relations existing between the community and its railroad corporations.

The commissioners propose therefore to divide their report into two parts, which will respectively treat of these divisions of their subject.

PART I.

Fifty-five Acts and two Resolves of special nature relating to railroads were passed by the last legislature. Among these were nine Acts of incorporation of railroad companies, and four of street railways ; two lapsed railroad charters were revived, and one street railway charter. No information of any action had under the street railway charters has reached the commissioners. In Appendix B of this report will be found a condensed statement of the organizations effected and the work of construction done during the year. Seven of the companies

chartered by the last legislature organized, and two of these have completed their roads. The whole amount of additional completed road reported this year over that reported last is 37.10 miles. The only event of any significance in the way of construction within this state during the last year has been the completion of Mansfield and Framingham road, which was opened in June last, forming the last link in the chain of roads connecting New Bedford with Fitchburg and the northern railroad system. Upon the nine roads chartered in 1870, but five miles have been constructed, in so far as the commissioners are advised.

INCORPORATION BY SPECIAL CHARTER.

In their first report the commissioners alluded at some length to the evils incident to the practice of authorizing all railroad construction under special charters, which has ever prevailed in this Commonwealth. They desire now to call attention to the criticisms they then made upon this subject. (First Annual Report, pp. 44-6.) The experience of the last legislature and the observations of another year, have more than confirmed them in the opinions then expressed. Every year that the existing system continues it greatly aggravates the labors of the session and needlessly adds to the confusion of a mass of legislation, the present condition of which is appreciated by very few. There might be a degree of compensation for these evils if the practice served to perpetuate any distinctive policy. This, however, is not the case. There are no recognized principles upon which charters for the construction of new railroads are now granted or withheld by the Massachusetts legislature. A system of special legislation is usually justified upon the assumption that certain public duties can best be performed by monopolists, who are to be protected and regulated in the enjoyment of their monopoly by law. The existing railroads of Massachusetts are not at present regulated by law, neither does the legislature protect them against injudicious competition. As instances in point, in 1868 a charter was granted authorizing the construction of a road parallel to a part of the Boston & Maine line, and not averaging more than a mile distance from it; in 1869 three charters were granted for roads from Taunton to Providence; in 1870 the Lexington branch was transferred from the Fitchburg to the Boston & Lowell road. The present

system might, therefore, more correctly be described as one of free construction under special laws. A negative decision as to any scheme has consequently ceased to be regarded as final. The same questions are yearly fought over in committee, and on the floors of the two houses with a uniform final result,—any charter that is asked for is finally granted. The process necessary to procure success may be described as a mixed one,—consisting of persistency, combined with log-rolling. It, however, rarely or never fails in the end, and the exceptions to the rule, if any occur, are where some opposing and existing corporation steps in and itself furnishes the desired accommodation, or a part of it, in order to prevent the organization of a competing line. These questions between proposed routes and between contending companies, as in the case of the Draper and Carpenter routes to Lowell, and the Lexington branch, in the session of 1870, occupy more than half of the time of committees, and are a fruitful source of delay in legislative business. In the opinion of the commissioners the evil is a wholly unnecessary one. Massachusetts is one of the few states in which these questions are not now regulated by general laws, and the commissioners have in vain sought elsewhere for indications of those evils, either of excessive competition or of unwillingness to construct under general laws, which special legislation is here supposed to obviate. So far as excessive competition is concerned, as causing injury to existing corporations, experience abundantly proves that under a general law, railroad corporations can protect themselves quite as efficiently as is desirable, without recourse to the lobbies of the legislature ;—as regards the supposed necessity of encouraging railroad construction by holding in check the undue formation of competing lines, the recent experience of Massachusetts distinctly indicates that the danger lies not in an excessive construction, but in the inability to construct what the community really needs.

In their first annual report (Appendix G) the commissioners presented a draft of a general law authorizing the construction of certain branch railroads. This bill failed to recommend itself to the judgment of the committee on railways, and was never, except in parts, reported for legislative consideration. On more mature reflection the commissioners are of opinion that

this bill did not meet the requirements of the case. It was much too limited in its operation,—too narrow in its scope. The commissioners have therefore prepared the draft of a new bill, embodying they believe all the provisions of a general law in relation to the organization of the companies and construction of railroads, which they would now recommend to the consideration of the present legislature. It will be found in Appendix O of the present report. Should it be enacted into a law, with such improvements as may be embodied into it by the committee on railways, and after undergoing the test of a thorough legislative discussion, the commissioners entertain a confident hope that it will remove one of the greatest sources of abuse and delay in the legislative business which now exists, and will put a stop to those discreditable, but constantly recurring struggles between corporations in the lobbies and upon the floors of the two houses, which have of late constituted regular features of every session.

MUNICIPAL AID TO RAILROAD CONSTRUCTION.

Closely connected with railroad construction is the question of municipal aid in encouragement of it. It seems now to be generally conceded that some provision for the construction of a certain amount of railroad facilities is, in this country at any rate, a matter of public charge. The especial disposition made of the amount thus authorized to be appropriated is usually left to the discretion of the particular localities interested. A general law authorizing railroad construction should therefore be supplemented by some provision, generally applicable, regulating the public contribution to it. Until within the last year, this, also, has in this Commonwealth been provided for solely by special legislation, which practice has left many Acts upon the statute book based upon various and discordant principles. This much-vexed question was put to rest in the last legislature by the passage of a general law which authorized, under certain limitations and restrictions, any towns of the Commonwealth containing less than 12,000 inhabitants to subscribe in aid of railroad construction within their limits. The constitutionality of this class of Acts has, because of an adverse decision of the supreme court of Michigan, been a subject of much discussion during the last year. The question has not as yet

been brought before the courts of Massachusetts. The legislation of the last year has, however, been generally and favorably commented upon in other sections of the country, and recommended as a reasonable and satisfactory basis upon which to adjust a practice out of which very grave abuses and legal complications have elsewhere arisen. So far as Massachusetts is concerned the law in question authorizes in the whole state an appropriation of no less than \$22,000,000 towards railroad construction. The accompanying table shows the amount thus authorized to be voted in each county of the state, as well as the proportion of the whole amount already actually applied.

TABLE No. 1.

COUNTIES.	Valuation of 1869.	Five Per Cent. of Valuation.*	Amount Voted by Towns to Railroads.	Balance avail- able under the Law.
Barnstable, . .	\$14,523,950 00	\$726,197 00	\$115,800 00	\$610,397 00
Berkshire, . .	36,508,558 00	1,825,427 00	233,000 00	1,592,427 00
Bristol, . . .	18,026,633 00	901,331 00	—	901,331 00
Dukes, . . .	2,287,973 00	114,398 00	—	114,398 00
Essex, . . .	41,222,496 00	2,061,124 00	245,000 00	1,816,124 00
Franklin, . .	14,433,376 00	721,668 00	90,900 00	630,768 00
Hampden, . .	25,507,267 00	1,275,363 00	43,800 00	1,231,563 00
Hampshire, . .	25,855,358 00	1,292,767 00	547,400 00	745,367 00
Middlesex, . .	88,778,704 00	4,438,935 00	211,700 00	4,227,235 00
Nantucket, . .	2,027,359 00	101,367 00	—	101,367 00
Norfolk, . . .	72,758,584 00	3,637,929 00	—	3,637,929 00
Plymouth, . .	30,092,680 00	1,504,634 00	225,000 00	1,279,634 00
Worcester, . .	68,300,303 00	3,415,015 00	638,400 00	2,776,615 00
Totals, . . .	\$440,323,241 00	\$22,016,155 00	\$2,351,000 00	\$19,665,155 00

By chapter 64 of the Acts of 1870 it was made the duty of any city or town clerk to transmit to this board a certified copy of any vote under which a subscription of public means was made to any railroad corporation. A tabulated statement of the action had in the several cities and towns, both under the general law of 1870 and all previous private Acts, as well as the amounts hitherto subscribed in aid of railroad construction will be found in Appendix D of this Report. Hitherto

* In computing this column fractional parts of a dollar are disregarded.

the rule requiring a two-thirds affirmative vote in such cases has not affected any result; in certain cases less than a majority vote has been cast in favor of an appropriation, but in no case as yet, (September 30th,) in which action was had under the general law, has the affirmative vote been more than a majority but less than two-thirds.

TERMINAL FACILITIES ON THE NORTH SIDE OF BOSTON.

Under the provisions of § 2 of chapter 301 of the Acts of 1870, "the board of harbor commissioners and the board of railroad commissioners are hereby instructed to confer with the authorities of the city of Boston, and the officers of the several railroad corporations owning or operating railroads which enter said city at its north side, and to report to the next legislature upon the feasibility of maturing some definite and comprehensive plan for the future accommodation of said railroad corporations, both as regards the wants of navigation and terminal facilities in Boston; and also to report a draft of such plan, if any shall appear to them to be feasible." This investigation has occupied much of the time and attention of the members of this board during the past six months, and the whole subject referred to has been laboriously gone over. A separate report upon it will, however, be presented by the joint commission during the session of the legislature, and no further reference need be made to it in this place.

RAILROAD RETURNS.

In accordance with the provisions of chapter 307 of the Acts of 1870, the returns of the several railroad corporations of the state were this year made to this board instead of to the Secretary of the Commonwealth as heretofore. The date of the termination of the railroad year was also changed from the 30th of November to the 30th of September. The same Act authorized this board to "order such changes and additions in the forms of said returns and reports as they shall deem expedient." The commissioners, feeling that the forms of return hitherto used did not meet existing requirements, and that the conclusions to be deduced from them were very unreliable, have given considerable attention to this subject. As a result of a careful comparison of tables in use here and elsewhere, a

new form has been prepared and copies of it transmitted to the several corporations of the Commonwealth before September 30th, so that the provisions of the law, requiring one year's notice, are complied with, and the change can be effected for the next railroad year. A copy of the new form will be found in Appendix E.

In preparing these returns the commissioners have had two ends in view: (1) the obtaining of greater particularity of return; and (2) a more uniform system of accounts. It is now almost impossible, with the means at hand, to effect any minute analysis of the business of our railroads through any considerable period of time. The commissioners have labored under the greatest disadvantages, arising from this cause, which have thrown grave doubts over many conclusions they have arrived at. The value of their investigations in the future may be considered to depend on the success they meet with in procuring information and statistics, which are at once minute and reliable, in a greater degree than upon any other one condition. Of course every amended form of return will impose a certain amount of additional expense, and exact considerable additional labor from the employés of the corporations. This is inevitable. At the same time the people of Massachusetts pay twenty-five millions a year to these corporations, and if by paying a few thousand more they can obtain such information as they absolutely need to enable them to deal intelligently with them, such additional outlay would be far from wasted. In such a case the labor and cost involved would constitute the least consideration.

The circular which accompanied the new forms, where they were transmitted to the corporations, is also printed. (Appendix E.) The commissioners take this occasion to say again that they are anxiously waiting for suggestions on this subject, or objections to the form proposed. Unless these, however, are speedily forthcoming, the form as printed will take effect for the next year.

TOOLS ON RAILROAD TRAINS.

The commissioners also desire to call attention to certain of the tools specified to be carried on every train of cars, under the provisions of § 1 of chapter 372 of the Acts of 1870. The

enforcement of this Act was especially referred to this board. In putting it in practical operation, the commissioners have been forced to the conclusion that in certain respects the Act was passed unadvisedly, and imposes an unnecessarily bulky load upon locomotives and baggage cars. "Traversing jack-screws" are very useful tools, but they are both expensive and intricate of management. Were they at hand on the occurring of any ordinary accident, there would, in all probability, be no one present competent to use them. "Ropes and blocks suitable for hauling engines" are open to a somewhat different criticism. These are very bulky and cumbersome, and as they could not be used without the assistance of a second engine, would, in fact, be only in the way, in any ordinary case of accident. Ropes and blocks, more than sufficient to haul cars, are, as well as traversing-jacks, very appropriate and necessary articles in the equipment of wrecking cars, but out of place as train-tools. The commissioners would therefore recommend an amendment to the Act referred to, in order that they may justifiably exact a strict compliance with it. A draft of the proposed amendment will be found in Appendix F of this report.

INGRESS TO AND EGRESS FROM RAILROAD CARS IN MOTION.

By chapter 78 of the Resolves of 1870, the commissioners were directed to consider and report to the present legislature, "whether any and what legislation is necessary concerning the ingress and egress of passengers into and from railroad cars, while the same are in motion." With a view to forming some opinion of the proportion borne by accidents arising from this cause to all accidents to passengers, the commissioners examined the returns of the three States of New York, Ohio and Massachusetts, for the year 1870. They were somewhat surprised to find that while in Ohio 5 out of 16 accidents reported were referred to this cause, and in New York 34 out of 102, the number in Massachusetts rose to 13 out of 14. In these three States 52 accidents out of 132 reported arose from this cause.

Actuated by a strong desire to suggest some remedy for this source of frequent accident, the commissioners have given the best consideration in their power to the possible legis-

lative provisions calculated to meet the case. They regret to say that, without undertaking at great expense and public inconvenience to wholly revolutionize the methods of carrying passengers by rail within this state, they are unable to suggest any effective remedy. It appears to them to be useless to enact laws which are opposed to the habits, and, indeed, to what may be called the genius of the people for whose protection they are enacted. The whole system of American institutions is based upon the principle that, with due warning given, people can take quite as good care of themselves as government and corporate officials can take of them. In many foreign countries a different principle obtains. The rules of railroad corporations seem there based upon the supposition that all passengers are bent upon self-destruction, and will succeed in their designs upon themselves the moment they cease to be watched and directed. Accordingly, from the moment they reach a station to that on which they leave it, they become almost irresponsible agents. They are fenced in until a train arrives ; they are then made to pass through a particular gate to get into it, and, when in, they are locked up until a destination is reached, when they are released, and again made to pass through a gate, and thus to leave the premises of the company. The cars are differently arranged from those in use in America, and on the compartment plan ; no passenger can possibly pass from one coach to another while the train is in motion, and the freedom of communication is practically cut off. Even under these circumstances the commissioners are not satisfied that greater danger to human life attends railroad travelling in Massachusetts than in Europe. On this point they have not been able to obtain the latest comparative statistics, but in 1863 it was stated by high authority * that the number of passengers “ killed and injured from causes beyond their own control, would appear to have been on British railways 1 in 334,000 ; on Belgian railways 1 in 1,600,000 ; on Prussian railways 1 in 3,000,000 ; on French railways 1 in 4,000,000.” In Massachusetts in 1869 the casualties of all descriptions among passengers were 1 in a little more than 2,000,000. These figures, so far as they go, would not

* Institution of Civil Engineers—Minutes of Proceedings. Vol. 21, p. 363.

encourage a disposition to change. Meanwhile, the authority just quoted estimates the dangers of the same description in stage-coach travelling as 1 in 28,000. All of which, if correct, would tend to show that the present system of railroad travelling in Massachusetts is nearly a hundred-fold safer than the old stage-coach system, and will compare not unfavorably with the systems in use in Europe.

Certain things in relation to the safety of the travelling public are clearly matters for police regulation ; such are the precautions as regards brakes, bridges, switches, track-crossings, &c.,—over these passengers cannot exercise any judgment, and must rely for protection upon the laws which establish the responsibility, whether civil or criminal, of the corporations. The matter under discussion does not fall within any of these heads. The only possible remedy would be to enact by law that cars in motion should be locked up and only unlocked after a train had come to a full stop ; and even this, though it would prevent egress, would afford no remedy against the most fruitful source of accident, the attempt of persons to get upon cars when in motion. The commissioners must, therefore, confess their inability to propose any satisfactory legislation in the premises. At the same time they would call attention to one improvement in car building which affords a certain degree of the desired protection, but the adoption of which has seemed to encounter some unusual objection among the railroad managers of Massachusetts. The improvement known as the “ Miller platform ” was favorably adverted to in the first report of this board (pp. 90–1), and it effectually precludes all danger of passengers falling between cars while passing from one to another. It has been very extensively adopted in the Western and Middle States, though hardly at all in New England. Not only does it greatly contribute to the comfort of all travelling, by effectually putting a stop to unsteady motion, and especially to jerking, both in stopping and starting trains, but it is in two respects a great safeguard against the worst accidents to which railroad travel is subjected. It prevents what is called “ telescoping,” and, being a self-coupler, disconnects in case one car in rolling down an embankment threatens to draw the rest of a train after it. This is a patent invention, and the commissioners do not see how its use can be made compulsory ; indeed, it is not

impossible that practical difficulties may exist in its use upon roads with very sharp curvatures. The commissioners must, therefore, content themselves with again, in this connection, calling attention to it, and repeating as earnestly as they can the recommendation contained in their previous report.

SAFETY SWITCHES.

In regard to one other subject referred to them for report in the same Resolve (chap. 78) the commissioners desire to make a decided recommendation which they have put in the form of a statute provision, the enactment of which they would strongly urge. There is hardly any one thing so productive of accident as the displacement of switches. The ingress and egress from cars only involves risk to individuals, but the difficulty referred to endangers whole trains. It should, in the opinion of this board, immediately be made compulsory upon all railroad corporations to hereafter put into their main tracks none but the Tyler or such other safety switch, as shall previously receive the written approval of this board. It may be that improvements under another name will be invented, and it would therefore be injudicious to particularize any particular switch without leaving somewhere a discretion as regards it. Neither do the commissioners desire to recommend an immediate and compulsory substitution of the safety switch for those now in use. They would, however, strongly urge that the substitution of these switches should be effected just as fast as any part of the iron of the present switches calls for renewal. A statute provision embodying this recommendation will be found in Appendix G of this report.

CODIFICATION OF LAWS.

It was provided in chapter 71 of the Resolves of 1870, that this board should "prepare a codification of the general laws relating to railroads and railroad corporations." The commissioners have performed this duty, and the result of their labors will be embodied in a document to be presented at an early stage of the session, and which will present the exact condition of the general railroad laws of the state, as they exist at the time of the meeting of the present legislature. Some marginal notes and recommendations have been appended by the commissioners, but in no case incorporated into the text.

The commissioners would recommend that at the close of the present session, and after all the modifications of the year have been matured, the general laws as they then stand shall be embodied into one Act and all previous legislation repealed.

ANALYSIS AND INDEX OF SPECIAL RAILROAD LAWS.

The same Resolve also provided that this board should prepare "analyses, indexes, and tables of reference to the charters of the railroad corporations of the Commonwealth, and to all special laws regulating said corporations. * * * In the preparation of said document they may employ a competent assistant." Acting under the authority herein conferred, the commissioners were fortunate enough to secure as an assistant in this duty the Hon. Ellis W. Morton, whose past experience as a member of the committee on railways, and whose familiarity with the confused and shapeless mass of legislation referred to, peculiarly qualified him to undertake the proposed task.

The commissioners, up to the present time, have been otherwise too much engrossed to render Mr. Morton any assistance, but he has zealously applied himself to the work in hand. Under date of December 10, 1870, he reported to this board as follows:—

"Charters of railroad corporations, and Acts directly and indirectly relating to or affecting them, form a large portion of our special laws. Such is the interdependency of these Acts, that to ascertain with entire accuracy all the provisions of law which define the privileges and duties of a single one of the older corporations, the investigator can hardly do less than examine the Acts concerning every corporation, as well those previously as subsequently established.

"To obviate the necessity of this somewhat blind and indefinite task, was evidently the intention of the legislature, and to do it effectually, it has seemed to me that the work should be done on the plan of a digest.

"I have undertaken to make a thorough digest of every Act, in chronological order, relating to each corporation, accompanied with the most complete references possible; so that the names of corporations being arranged alphabetically, there will be found under a single title a full analysis of all Acts relating specifically thereto, and, by references, all Acts relating thereto under other titles. I

think references to judicial decisions should also be embraced in the plan.

“My design is to present a volume, covering the entire ground contemplated in the Resolve (1870, chapter 71), that shall contain in itself the vital parts of every Act, with the most convenient reference to the Act.

“A volume of the kind must be of considerable service, and any abridgment of it must lessen its usefulness. Its preparation will involve time and care, and at present, I cannot fix a period for its completion. It shall be done with such dispatch as shall be consistent with faithfulness.

“The use of the word ‘document’ in the Resolve has caused me to hesitate somewhat in attempting to produce something of a character not generally included within the limits of a *document*, and requiring, it may be, more labor and more printing than the legislature anticipated; but I have been guided by a knowledge of existing wants, and the general terms of the Resolve.”

The general plan of the work thus stated by Mr. Morton has been approved by this board. The attention of the legislature and of the committee on railways is now particularly called to the subject, as this very important work has not yet progressed so far that any desired alteration or simplification of the plan could not easily be effected.

FREIGHTS, FARES AND CHARGES.

The only other subjects specially referred to the consideration of this board, were those contained in chapter 54 of the Resolves. It was there provided that this board should “inquire into the subjects of tolls, freights, fares and charges exacted on the several railroads of this Commonwealth, and also a plan and tariff to prevent unjust discriminations in the levying of freights and travel tolls from way stations, and between way stations, and also to examine whether the interests of the public will be promoted by compelling the railroads to perform ‘express business’ for the territory contiguous to their lines,” &c. The first and more important part of this Resolve,—that relating to freights, fares and charges,—must necessarily form the principal subject of discussion in the second part of this report. Two other matters referred to can, however, best be disposed of in this connection.

DISCRIMINATIONS AGAINST LOCAL STATIONS.

Under the very severe competition between the great trunk routes, consisting of many connecting and combined roads, very few, if any, of which are within the jurisdiction of this Commonwealth, lower rates have ruled for all through freights to and from competing points during a portion of the last year than were ever before known. Cases have come within the knowledge of the commissioners, in which shipments have been made at rates far below the lowest possible cost of transportation. These rates are not necessarily made by the individual corporations, but by the agents of the associated lines at points all over the continent. The smaller local corporations of this and other states are generally desirous of being members of these associations, but the low rates contracted for bear upon them with peculiar hardship. Unlike the great trunk lines,—the Boston & Albany or the New York Central,—they cannot make up by the mass of the movement and the length of the haul for the lowness of the rate. They are called on to move comparatively small quantities, a short distance, at very low rates, and to incur in so doing the cost of inevitable detentions at points of delivery. They are thus not infrequently compelled to transport at a loss, or to cease to belong to the combinations. The rules of the associated lines, over which it must be remembered Massachusetts can exercise no legislative control, consider each road as one unit,—that is, goods are only billed over such roads to certain specified points of intersection or to their terminal points. Properly, therefore, as regards these through rates, or what is known as the *pro rata* system, the whole of any given road becomes one point, so far as charges are concerned, and the road receives as its share of the freight money an amount proportioned to the length of its entire line as compared with the whole distance of the united roads traversed, and this regardless of the fact that it may leave the goods at a local point far short of the terminal point to which they were billed. Acting under these contracts, not a few roads have lost money. Certain of them, with what the commissioners cannot but consider a very illiberal and short-sighted policy, have endeavored to recoup their losses on the shipments to their terminal points by refusing to deliver *pro rated* articles at local points on their roads except on payment of the entire

through contract price to the technical point of delivery, it may be a hundred miles beyond, and a large local charge of, perhaps, \$20 per car in addition thereto. In support of this exaction they have not only used the argument that they must get a living out of some one, and therefore, if they lose on business to a point where they meet competition, they must double their rates to all points where they are free from it,—not only do they openly confess to this curious practical result of the principles of competition when relied on as a safeguard against railroad exactions, but they go further and defend it upon the ground that even thus, though at a sore disadvantage as compared with competing points, the local points are still supplied more cheaply than they would be at purely local rates. The commissioners do not care to argue this question in the light of sound policy as regards the corporations themselves. The only reliable business the railroads now have is their local business. It is their evident interest to foster and build this up by every means in their power. Corporations which cannot see this,—which by discriminating charges crush enterprise and industry out of these isolated towns, and force them to move to those points where the railroads meet only competition,—a corporation which at this late day systematically pursues such a course as this, is probably beyond the reach of argument. One thing, however, is very clear. Massachusetts is now made up of small industrial centres; these cannot by any possibility enjoy any great degree of railroad competition; that they should not be crushed out of existence and all population forced to concentrate at some half-dozen competing and railroad centres, is a matter of the greatest moment to the Commonwealth. Local points must therefore be protected from exactions of the nature of that described. If they cannot be protected in one way they must in another. The real difficulty lies in an unregulated railroad competition, and this is far beyond the reach of a Massachusetts legislature to correct. The subject is, therefore, a most delicate one to deal with, for ill-considered legislation, while it could not affect the *pro rata* contracts of the combined roads, might force Massachusetts corporations to withdraw from them; any such result would be well-nigh ruinous to the industry of the state. The commissioners desire therefore in this matter to move very cautiously, applying simply external remedies, and thus tentatively

ascertaining how some measure of a radical nature may possibly be at last devised. At present they are not prepared to do more than to propose a law which shall compel all corporations to treat their entire routes without discrimination as regards *pro rated* business ; that is, charging for it, in the same way in which the company is remunerated, as one point. Massachusetts cannot compel a combination of roads, only a very inconsiderable portion of which is within her own limits, to alter its form of contract and to bill at separate *pro rata* prices to all local points. It can, however, stipulate that local or isolated points shall be no worse off than terminal or competing points ; that goods which pay the full *pro rata* price to the terminal point on a road shall be delivered at no greater price at any local point on the same road. The commissioners do not now see how this measure can result in injury to any legitimate interest. A similar regulation already obtains upon the Pennsylvania Railroad. "The rule that has governed this company, is not to charge to any intermediate point, a greater rate than is required to one at a longer distance. Under this rule, which we think entirely defensible, the average charges for the through and local business per ton per mile passing over your line, are nearly equal."* Corporations which cannot comply with this very reasonable rule had best, perhaps, as many have already done, retire from the *pro rata* combinations and content themselves with charging specific rates to all points on their lines, both local and terminal. A more elaborate investigation by the committee on railways may develop practical difficulties in the way of an application of this law to existing conditions in Massachusetts, but they fail to suggest themselves to the commissioners. A draft of the proposed law will be found in Appendix H of this report.

THE TIME FREIGHT AND EXPRESS BUSINESS.

Under the Resolve last referred to (1870, chapter 54), the commissioners were also directed "to examine whether the interests of the public will be promoted by compelling the railroads to perform 'express business' for the territory contiguous to their lines, and report thereon to the next general court, together with such plan as they may deem expedient." This is

* Twenty-Third Annual Report, Penn. R. R. Co., Feb. 15, 1870, p. 19.

a subject which the commissioners have very much at heart. In their opinion a searching reform in the whole business of "parcels delivery" is very essential to the increasing development of Massachusetts, and in this connection they desire to call attention to the remarks (pp. 66-75) in their first annual report. When it is remembered that of the 3,100 licensed express carriers and agents in the United States which paid taxes under the internal revenue laws in 1869, 500, or nearly one-sixth of the whole, belonged to Massachusetts, with hardly one-thirtieth of the whole population, some estimate may be formed of the important part this machinery plays in the industry of the Commonwealth. The commissioners greatly regret to say that nothing has resulted from the voluntary action of the railroad corporations in the direction heretofore indicated by them. Further measures, and of a more compulsory nature, may, therefore, now be deemed advisable, but this subject the commissioners do not propose to discuss here. Its great importance, and the length to which this report must necessarily extend, make it, in their opinion, desirable that it should be made the subject of a future and supplementary report to the present legislature, rather than be here buried under a mass of other and miscellaneous matter. In preparing such a report the commissioners desire to enter more minutely than would here be expedient, into the systems and tariffs now in use in foreign countries, especially in some of the European continental nations. The practical value of the suggestions they have to make in this respect will depend in a very large degree on the favor with which the legislature and the committee on railways shall receive other recommendations contained in the present report.

COMPLAINTS AND PETITIONS.

A smaller number of complaints and petitions, demanding a hearing on account of alleged grievances, have this year been presented to the board than might naturally have been expected. In regard to such cases as have come before them, with two exceptions, no further reference is here necessary, as detailed reports of them will be found in Appendix I of this report. Of the two cases referred to as requiring special notice, the first related to

THE STATION AT GROTON JUNCTION.

A numerous signed complaint, in accordance with the provisions of sections 3—4 of chapter 408 of the Acts of 1869, was brought before the board, in January, 1870, in relation to the condition of the Groton Junction station. A hearing was had upon it on the thirty-first of January, 1870, and subsequently the place was visited by the commissioners, and the buildings complained of inspected. The commissioners had no difficulty in arriving at a conclusion. They found the premises old, dangerous, ill-arranged and insufficient;—in fact they constituted not only a nuisance, but a very disgraceful one. This conclusion was immediately communicated to the officials of the roads interested, and they were requested to take action accordingly. Some months were passed in maturing and discussing plans, but as little real progress seemed to be made, the following vote was passed and communicated to the corporations mentioned in it:—

“IN BOARD OF RAILROAD COMMISSIONERS, }
July 6, 1870. }

“*Voted*, That it is the opinion of this board that the Fitchburg Railroad Company and the Worcester and Nashua Railroad Company ought to build a new station for public accommodation at Groton Junction; that it should be commenced forthwith and completed within six months.”

The period named will expire on the 6th day of January, 1871, but the commissioners regret to say that the work of construction is not yet begun. They understand that the plans and details are agreed upon, but there is an unjustifiable delay in beginning work upon them. Under these circumstances the commissioners are bound by law to “report the proceedings to the legislature” (section 3, chapter 408, Acts 1869), but they are not prepared to make any recommendation as regards them. The corporations fully intend to make the desired improvements; they are merely unreasonably slow in doing it. While the power of the commissioners in the premises is now wholly exhausted, it hardly seems worth while to invoke the special intervention of the legislature.

ALLEGATIONS THROUGH BOSTON BOARD OF TRADE.

The other subject which calls for a special reference in this connection is contained in a communication of November 2nd, 1870, addressed by Hon. Lewis J. Dudley, of Northampton, to the Boston Board of Trade. This letter, as well as a confirmatory letter from the firm of C. F. Hovey & Co., of Boston, to the Secretary of the same board, covered numerous allegations of unnecessary delays and excessive charges in forwarding freights on the part of the several roads connecting Northampton and other towns in that vicinity with Boston. Copies of these communications were published in the daily papers, and were ordered by the Board of Trade to be forwarded to this commission. The various specific statements contained in them will be investigated by the board in the usual way, and will be reported upon in the proper place. As they seem, however, calculated to create a misapprehension in the public mind, the commissioners take this opportunity to say that one great cause of all the existing railroad abuses in this state is the failure of private parties to forward their complaints either to this board or to the officials of the delinquent roads. To do so calls for the sacrifice of nothing but a sheet of paper and five minutes of time, and yet parties will submit to great inconvenience, annoyance and delay, and will waste much time in vague denunciation rather than have recourse to this perfectly simple but yet effective remedy. All that the commissioners ask for are specific statements from responsible parties, and they feel perfectly safe in guaranteeing an effective remedy. So far as the corporations immediately referred to in the communication of Mr. Dudley are concerned, the commissioners feel in justice bound to say that every representation made to them by this board has been promptly attended to, and due weight has been given to every suggestion; they are, in fact, so far as this body is competent to judge, actuated by a sincere desire to remedy all abuses which come to their knowledge, and to remove all causes of complaint incident to their present system of management.

JURISDICTION OF COMMISSION.

The commissioners have uniformly given very careful consideration to all complaints and petitions, and in no case hitherto

have they as yet seen any occasion to revise the conclusions they have arrived at. Before leaving this subject, they desire to call the particular attention of the legislature and of the committee on railways to the expediency of altering and extending the nature of the jurisdiction of the board. Petitions and representations are yearly crowded in upon the legislature in relation to all sorts of matters of special legislation, touching station accommodations, freighting facilities and numerous kindred subjects which must arise out of a complicated system such as the railroads long since grew to be. To each of these the legislature has hitherto been in the practice of giving such special attention as lay in its power. For it to continue to do so, is, as the system develops, much the same as if, without general laws in relation to them, it undertook to examine into the merits of all civil disputes or criminal prosecutions, which are now disposed of by the courts. This will necessarily continue to be the case until some radical measure of reform is enacted. Upon this point the commissioners feel a certain delicacy in making any specific recommendations or in presenting the draft of a law. The necessary legislation must emanate from members of the legislature itself, and not from persons outside of it. While the experience of the commissioners upon this, as upon all other subjects, is at the service of the committees and of the legislature, they prefer here to confine themselves to a general reference to it. Others are, as regards this matter, better judges than they, both as to what is expedient and what is practicable.

ACCIDENTS.

The usual tabulated statement of accidents, resulting in personal injuries, and their causes, will be found in Appendix K of this report. It will be seen that 141 casualties have been reported to the board during the ten months included in the last railroad year, of which 101 resulted in the loss of life. Of the whole number injured, 34 were travellers, 33 employés of the companies, and 67 persons walking upon tracks or otherwise unnecessarily, if not illegally, exposing themselves to danger. Of the casualties resulting in death, 23 occurred to travellers, 24 to employés, and 54 to all others. The proportion of accidents of all descriptions to travellers to the whole number of persons reported as carried, was as 1 to 727,104.

Of the accidents to passengers, 30 out of the 34 were caused by jumping on or off the cars while in motion, or by falling from the platforms, upon which passengers are forbidden by the rules to ride ; in one case a passenger left the train on the wrong side, and was struck by another train ; leaving only three accidents to passengers from causes not within their own control. Of the accidents to employés, six occurred in coupling cars, and the board takes occasion again to express the hope that this source of accidents may be soon removed by the invention of some satisfactory self-acting coupler, suitable for freight cars ; six were struck by bridges, not in every instance while on top of the train, but in some cases leaning out at the side. Of the whole number of accidents reported, nearly one-half have happened to persons walking upon the track or riding without right, and fifty out of these sixty-seven accidents have proved fatal. The commissioners learn that wherever the railroad corporations have endeavored to enforce the law by prosecuting people walking upon the track, this action on their part has been followed by obstructions placed upon the track in the same neighborhood. A vague general impression may, in fact, be said to prevail that the public has a natural right to walk upon railroad tracks, the law to the contrary notwithstanding, and any attempt to infringe upon this right, excites a reckless spirit of retaliation. Under such circumstances it might not be inappropriate to leave those entertaining such sentiments to try conclusions with the locomotives, were they the only sufferers. Unfortunately, however, such is not the case ; and it apparently only remains for the law to try to regulate a practice which experience shows it cannot prevent. The board desires, therefore, to renew the suggestion made by it last year as to authorizing town and city authorities to provide foot-walks within the limits of a railroad location, with the consent of the corporation ; provision being made that the railroad companies shall not be liable for any accidents occurring thereon.

Of the accidents reported on the street railways, all but one were to passengers, and all of these from getting on or off cars in motion, more than half at the front platform. The commissioners renew the recommendation of last year in regard to keeping the front platform closed.

The object of the legislature in directing all accidents to be

reported to this board, and an examination into them to be made by it, was undoubtedly twofold: 1st. To provide for the enforcement of any penalty prescribed, in case accidents arose from the failure of a corporation to obey the laws of the Commonwealth; and, 2d. In all cases where it should appear that the existing laws were insufficient to provide for the security of the travelling public, to make provision for supplying such deficiency. No case within the last year has come to the knowledge of the commissioners in which any accident could be traced to the criminal disregard by any corporation of precautions specified by law. Three cases, however, have presented circumstances either calling for particular notice, or where the law seems to be insufficient for the protection of the travelling public.

THE ATHOL ACCIDENT.

On the 16th of June, as the express train on the Vermont & Massachusetts Railroad was rapidly approaching the bridge over the Miller River, in the town of Athol, on coming round one of the sharp curves by which the bridge is approached on either side, the locomotive struck a hand-car in which the section-master and his assistant, under a mistake as to time, were going to another part of the road to do some work on the track. There was no space in which to stop the train, the hand-car was violently flung aside, and probably some tool fell from it in front of the locomotive by which it was thrown off the track on the bridge, diverging more and more from the rails and dragging the train after it, until it ran off the stringers, when it naturally broke through the floor timbers, and was precipitated into the bed of the river below. In this case the bridge was sound, all the usual precautions had been taken, and yet three lives were lost, and numerous personal injuries inflicted, which would represent thousands of dollars to the corporation. A simple precaution would have prevented this accident. Did the roads make it a rule to lay down upon all bridges and the approaches thereto double or guard rails inside of each rail of the track, a locomotive or car, meeting some obstruction on the rails on one side, would have its wheels on the other side held between the track and the guard rail, and would thus move only straight forward and could not diverge

in such a manner as to run off the stringers. Or, if above the stringers, good sound cross-ties were placed, not more than 1½ feet apart from centre to centre, and extending three or four feet outside the rails to an additional stringer, with a guard timber placed midway between the rails, the engine or car on leaving the rails would be supported by the cross-ties, and would be prevented by the guard timber in the middle from diverging so far as to strike the side of the bridge. Either of these precautions would have prevented the catastrophe of June 16th. As old and used-up iron would answer every purpose of guard rails, the cost of taking this precaution would be very slight to the corporations. It would constitute a great safeguard to the travelling public, and the loss entailed by one such accident as that at Athol would probably cover the expense of laying down guard rails on every bridge of the Commonwealth.

The commissioners do not propose at this time to recommend a law making this precaution a compulsory one. There may well be many expensive deck bridges in the Commonwealth which would not admit of the change except at a heavy outlay. They wish now, however, to make a recommendation to the corporations, and to invite criticisms upon it. Should no more serious objections than they anticipate present themselves, they will at a future period draft a form of law to meet the case, and submit it for legislative consideration.

THE WORCESTER EXPLOSION.

As a freight train on the Boston & Albany Railroad was slowly passing through the city of Worcester, at noon on the 23d of June last, a case of dualin, one of the most destructive of known explosives, which was being transported in one of the cars, suddenly blew up, destroying track, cars, property and buildings throughout the immediate neighborhood, instantly killing one man who was walking on the track, and seriously injuring many of those living in adjacent houses. That the loss both of life and of property was not greater is almost inexplicable. As it was, the money damages directly and indirectly sustained by the corporation considerably exceed \$50,000. The case in which this compound was packed was shipped without any mark upon it, or verbal instructions as to its danger-

ous nature, and the employes of the road even billed it as "dealings," under the impression that it was a manufacturing chemical, or patent medicine: an article of the most dangerous character and subject to the highest class of special rates was thus forwarded as third-class freight. Curiously enough, also, and as if for the purpose of illustrating the absolute necessity of full notice of contents in all cases of shipping explosives, a box of fuses from another manufacturer, made to explode this very compound, was shipped on the same car, and the two packages were placed side by side. A magazine of the most dangerous character was thus made to move through the towns and villages of the Commonwealth, without a single precaution taken, and without the knowledge even of the employes of the road. Had the explosion taken place a few seconds earlier, as the Providence & Worcester passenger train was passing the freight train, and the vibration of which should properly have brought it about, then one or more carloads of passengers must have been blown to pieces.

On examination it was found that no provision for such cases had been made in the criminal law of the Commonwealth. The transportation of explosives cannot, of course, be prohibited by law; it should, however, be guarded by every precaution against accident. In case of disaster the corporations are liable in damages to any extent; it is but justice that shippers who forward such articles without giving full notice of their nature should be subject to a criminal penalty. Provision for such cases has long existed in the statute law of England and of the United States, and by oversight only has been omitted from that of Massachusetts. The commissioners would, therefore, in order to secure a uniform responsibility, recommend the passage by the legislature of an act based upon the United States law (U. S. Statutes at Large, Vol. 14, p. 81), but with such changes as make it conform to the character of our legislation. A draft of this law will be found in Appendix L of this report.

THE COLLISION AT "KNOW-NOTHING" CROSSING.

On the 12th of October a collision took place between a freight train, which was moving to and fro in the process of making up, on the tracks of the Boston & Providence Rail-

road, and the afternoon special train on the Woonsocket division of the Boston, Hartford & Erie road, on the track of the Boston & Albany, at the crossing of the two at grade, at the west side of the city. This accident properly falls within the ensuing railroad year, but the commissioners propose to mention it now, as any influence it may have on legislation should not be deferred. This collision, accompanied with loss of life and the destruction of two locomotives, curiously illustrates the utter impossibility of preventing accidents in the long run, wherever two roads are allowed to cross each other at grade. This subject was pressed upon the attention of the committee on railways of the last legislature. Certain corporations desired to have the existing law, which compels every engine-man, before reaching a crossing at grade, to stop his engine at some point within five hundred feet therefrom (General Statutes, chapter 68, § 93), to be so modified as, in certain cases, where the precaution was unnecessary, to leave in the hands of this board a dispensing power, or a power to substitute other regulations for stopping. This law applies to all railroads used for the transportation of passengers;—one passenger train a week passes over the Grand Junction Railway, and yet this constitutes it a passenger road, and compels every one of the four roads entering Boston on the north side of the city to stop every train or single locomotive, amounting to nearly 250 stoppages each day, at the track of this road. A great annoyance and an unnecessary delay and expense are thus incurred. The rule established is an excellent one, but it does admit of exceptions which ought to be provided for. In the case of the Grand Junction, for instance, the hours during which stopping is necessary could be limited to certain portions of the day, and a reduced speed only required at other times. These cases are, however, purely exceptional, and, as a general rule, too many precautions cannot be taken at these crossings. At the hearing of the last session the existing law was sustained on the ground that, whatever inconvenience it might occasion, it at least rendered collisions impossible. After a careful consideration of the circumstances attending the collision of October 12th, the commissioners are wholly unable to suggest any additional securities. Every precaution was there taken which the law can provide. Not only did all trains of both roads stop at this crossing in obedi-

ence to the law, but an experienced signal-man and a simple and well-understood system of signals was provided, over and above the statute precautions, and yet in spite of all this, on a clear day, and in broad daylight, a collision took place. Unless caution can be legislated into engineers, and presence of mind into signal men, the law can do nothing more in such a case as this. The commissioners are unwilling to let the occasion pass without recommending, as strongly as they can, that under no circumstances shall any railroad hereafter to be constructed be allowed to cross the track of another railroad at grade. Where the crossing is at a point where the interchange of passengers takes place, a two-story depot and a system of switches will provide for every contingency. It is simply a question of the exercise of a little ingenuity attended by a small expenditure of money, but there is no serious difficulty to be overcome.

TRANSPORTATION OF CATTLE BY RAIL.

Before closing this part of their report, the commissioners desire to say a few words on the subject of the transportation of live stock by rail. This matter also was brought to the attention of the legislature at the last session. Members of the committee on railways have informed members of this board that it was then intended to refer the subject to the commissioners to report upon, but that, through some oversight, no action was taken in the premises. The question is one of great importance, both in a material and in a humanitarian point of view, and one to which the commissioners have devoted some attention. As at present conducted on the railroads of the United States, it is no abuse of language to call the whole system of cattle transportation an outrage on the first principles of humanity. Between the prairies of Kansas and of Missouri, and the cities of New York and Boston, there are now three usual places of rest and refreshment for cattle,—Chicago, Buffalo and Albany. The accommodations afforded at these places are very ample and the cattle are there supplied with food and water, and opportunity for rest. Their sufferings in transit between these places are, however, indescribable, as every traveller knows who has ever, on some hot summer day, glanced at a cattle-train as it stood on a railroad siding. The animals are taken directly from the prairie, which is the earthly paradise of all dumb creatures, and

are crowded as close as they can stand into cars, which are then slowly hauled, through from one to three days, to some point of destination. These trains yield the road to most others and pass hours on sidings; the animals are without any food or water, and often with insufficient ventilation in summer or shelter in winter; they are jolted off their legs and then goaded till they struggle up, for they cannot be permitted to lie down; they thus arrive at their destination trampled upon, torn by each others' horns, bruised and bleeding, having, in fact, suffered all that animals can suffer and live. Under the most favorable circumstances they leave the train panting, fevered and unfit to kill; under the least favorable, a regular percentage of dead animals is hauled out of the cars. The average shrinkage between Chicago and Boston is estimated at 10 to 15 per cent., and this does not include loss through deterioration in the quality of the meat, or the fact that, by goring and scratching, the hides are injured for purposes of tanning to an extent heretofore unknown. The argument of the drovers, whether correct or otherwise, is that shrinkage, deterioration and injury under the present system, involve less loss than a more humane but more costly transportation. The commissioners entertain grave doubts even on this point. Were the improved cars which have been invented brought into steady use, it would remain to be seen whether cattle transportation in them would not, through the better condition of the animals and the superior quality of the meat, command a price more than equal to the increased tariff rates. This board has nothing to do with the sanitary considerations involved in the matter; the simple question to be discussed here is the practical one:—What can be done in the premises? No real and radical reform can be anticipated until some line of roads shall demonstrate the fact that animal food, delivered on the hoof and in good order, is worth materially more in the market than the same commodity poisoned and reduced in quantity in course of transportation; that, in fact, humanity is the better economy. Though legislation cannot effect this full result, it can and should do something for animals, as it has already done much for the poorer classes of emigrants. A law was passed in 1869 (Acts, chap. 344) regulating this subject within this Commonwealth, and the officers of the society for the prevention of cruelty to

animals inform the commissioners that this law has been productive of most beneficial results. After consultation with the officials of the state board of health, the commissioners are not prepared to say that still further state legislation may not produce most advantageous results in the direction indicated in the report of that board on the subject of abattoirs, which act directly back on the methods of transportation. (First Report of State Board of Health, pp. 20-32.) This branch of the subject is, however, hardly within the province of this commission, nor, indeed, can any state legislation go to the root of the abuse, which lies in the wholly unregulated transportation of cattle through the country at large. The question in fact is not a state question ; it is, on the contrary, one directly affecting "commerce between the states," and can only be dealt with by the national government. At present, food tainted in the course of transportation is brought into Massachusetts and endangers the health of the people ; Massachusetts can affect that transportation only through her representatives in Congress. In view, therefore, of the importance of this question in every point of view, whether of humanity, of economy or of health, the commissioners would recommend that the legislature cause a memorial on the subject to be prepared for immediate submission to Congress, and that it be forwarded to that body with the usual instructions to our senators and representatives in regard to it.

PART II.

The remainder of this report must be devoted to a discussion of what may not incorrectly be termed the general railroad problem ; which includes the relations of the roads, both materially and politically, to the community and the law-making power. Before entering upon this portion of their work, the commissioners desire to recall attention to a passage in their previous report in relation to the topics involved in it. When they approached the subject a year ago they excused themselves from entering upon it, because of "the brief time they have had to pursue their investigations, the immense and conflicting interests involved, the necessity of falling into the fewest possible errors, and the utter futility of any legislation, which partakes rather of the nature of force than of an educated and reflecting public opinion. * * * Any solution of the questions arising out of the intricate relations of the community and the railroad corporations requires time and study, and a hasty or ill-considered solution is worse than none at all. The problem needs but to be stated to have the difficulties surrounding it appreciated. * * * No system which could possibly be proposed at this time would be based upon a correct understanding of these complicated considerations, or could command any general respect or stand the test of criticism. Such a work must be the last result, rather than the beginning of the labors of a commission." (pp. 42-3.) The distrust here expressed as to the value of their own conclusions is by no means yet removed from the minds of the commissioners. They are fully conscious that eighteen months is a period very insufficient in which to master so difficult a subject. The careful consideration they have given to it during the last year has tended to impress them with a consciousness rather of the difficulties which surround it, than with a confidence in their own abilities to deal with them. At the same time the desire on the part of the last legislature that this question should be met was so manifest, and the popular feeling in regard to it is rising with such

rapidity, that the commissioners feel that they have no choice left to them in the matter. Even if this were not the case, the language of chapter 54 of the Resolves of the last session hardly be considered otherwise than imperative. It must be taken to cover the whole ground, and to direct immediate inquiry to be made.

The commissioners propose, therefore, to take up this discussion in the present report at the point where they abandoned in their last. The experience and observations of another year, and the results of the United States census have confirmed them in the conclusions heretofore expressed. The degree to which the future of Massachusetts is bound up with the successful prosecution of manufacturing industry, as elaborately discussed in their first report (pp. 12-29, Tables Nos. 5 and 6), and the fact requires no proof, that, next to popular thrift and intelligence, the development of this industry chiefly depends on the excellence and freedom of the arrangements for internal communication. Little need be said in this connection of what is known as the through rail business of the community,—that which originates per se thousands of miles beyond the limits of the state, and of which the greatest part, involves connecting lines of road, nine-tenths of which, perhaps, are beyond the jurisdiction of Massachusetts. Interests, second in importance to none, depend upon the promptness, economy and facility with which this business is conducted, but, in the first place, the legislation of no single Commonwealth can affect it in a very great degree, and that of Massachusetts hardly at all; and, in the second place, in most respects it is fortunately in a very satisfactory condition. Sufficient evidence to support this statement is found in the returns for 1869-70 of the produce movement, which were adduced a year ago (First Annual Report, p. 34, Table No. 8), as indicating the degree of success with which the all-rail routes kept up the competition with the mixed routes between Boston and interior points. The accompanying table shows the amounts of produce reported to have arrived in Boston during the years, and through the channels specified. It will be noticed that the through all-rail routes are gaining more and more on the mixed routes, and are practically control the market. This, as was shown in the previous report, (p. 34,) indicates that the movement in qu

TABLE No. 2.

	FLOUR—BARRELS.		CORN—BUSHELS.		OATS—BUSHELS.		BARLEY—BUSHELS.	
	1866.	1869.	1866.	1869.	1866.	1869.	1866.	1869.
Boston & Albany Railroad, . . .	646,684	728,846	376,868	1,031,322	418,062	721,128	728	12,999
Northern Railroad, . . .	53,060	65,107	77,145	288,965	83,234	260,513	164,635	99,610
Fitchburg Railroad, . . .	34,211	24,874	29,862	64,007	104,737	95,034	42,698	10,104
Total by Railroad from West, .	733,955	818,827	483,875	1,384,294	606,033	1,076,675	197,951	122,713
Boston & Maine Railroad, . . .	16,515	18,238	1,574	896	55,600	3,109	25,135	26,005
Providence Railroad, . . .	88,683	61,281	1,100	632	3,593	3,093	-	-
Old Colony & Newport Railroad, .	6,711	12,544	-	800	-	-	-	-
Portland Steamer, . . .	53,992	40,284	2,695	-	1,298	352	4,020	13,370
New York Steamer, . . .	307,812	271,635	68,921	2,356	49,481	10,840	-	16,414
Baltimore Steamer, . . .	131,961	72,656	71,328	167,329	22,146	19,637	-	-
Philadelphia Steamer, . . .	25,013	3,699	100,441	70,006	8,216	5,476	1,740	-
New Orleans Steamer, . . .	15,213	6,952	205,701	17,231	6,138	-	-	-
Sail Vessels, . . .	54,637	16,190	1,395,399	774,555	509,565	294,713	33,144	57,061
Other sources, . . .	1,190	2,979	-	21,271	-	1,536	-	5,323
Total from seaboard, . . .	701,727	506,458	1,847,159	1,055,676	656,037	338,756	64,039	118,173
Total from all sources, . . .	1,435,682	1,325,285	2,331,034	2,439,960	1,262,270	1,415,431	261,990	240,886

is made at very low rates. Most of this, as well as of through business, is now done by what are known as despatch lines. These have already been referred to in another connection in this report; but as illustrating the extent of combinations and the very slight degree of influence to be exercised over them through state legislation, a few figures may here be out of place.

The Boston & Albany road belongs to three of these combinations, known as the Red, the White and the Blue line. No reports of these organizations are published, but the first is composed of four companies, aggregating 2,422 miles of road; the second of nine companies, aggregating 3,434 miles; the third of twelve companies, aggregating 4,413 miles. The smallest of these combinations, five years ago, in 1865-66, immediately after its organization, employed on an average not more than 700 cars, while the largest of them, in 1869, employed 1,800. The importance of these lines to the internal economy of Massachusetts cannot well be overestimated, yet there is within this Commonwealth but 210 miles of the Red line, or 8.70 per cent. of the whole; but the same number of the White line, or 6.10 per cent. of the whole, and but 418 miles of the Blue line, or but 9.47 per cent. of the whole.

Next to the Boston & Albany, the Boston & Lowell is the Massachusetts corporation most actively concerned in the railroad combinations. The position of, and the results accomplished by this corporation are, the commissioners believe without a parallel. Owning in all but 26 miles of road, and operating altogether but 125 miles, and representing \$5,000,000 of capital, this apparently insignificant combination, through the energy and ability of its management, has exercised a most perceptible influence on the whole railroad system of the country, including the largest and most powerful of its combinations. The corporation has two direct and important connections with the West, one by way of Ogdensburg and Lakes, the other by way of Montreal, the Dominion and Quebec. Through these it has, during the last year, kept up a competition with the more southern routes between Chicago and the East; and, in spite of the greater distance travelling being the equivalent of 15 per cent. of the whole, this competition has been so effective that it has kept the rates to an

Boston and the West always as favorable, and often more so, than those to and from New York. This combination mainly operates for through business through the "National Car Company," a Vermont corporation, which furnishes to the several roads 500 cars with adjustable axles. During the ten months ending October 31, 1870, 16,805 tons of outward, and 13,800 tons of inward freight have been moved in these cars at rates sometimes as low as six mills, but generally varying at from one to two cents per mile; while to and from Ogdensburg large amounts have been moved at \$2.50 per ton, or six mills per mile. Meanwhile this combination, so important an element in the prosperity of the Commonwealth, though it controls 400 miles of road to Ogdensburg and 1,150 to Chicago; though it has more than 1,000 additional miles of road contributory to it or fed from it; though it employs some 6,000 freight cars in doing its work of transportation in New England, yet has only 68 miles of it within the jurisdiction or subject to the laws of Massachusetts; not one-twentieth part of the whole.

The policy of Massachusetts as regards these great combinations is, therefore, manifestly dictated by circumstances; it should be one of extreme caution; it should rather avoid the creation of obstacles, than seek to impose regulations. In some respects such a condition of affairs may operate harshly, but this is an evil incident to our political system, under which the power to "regulate commerce between the states" is delegated to Congress. The commissioners, therefore, do not propose to dilate upon matters over which they can exercise little practical influence; they prefer at once to turn the discussion upon a class of interests of not less importance to the Commonwealth, and over which they may hope to exercise a control both direct and immediate.

If the through or external railroad relations of the Commonwealth are in a condition even more satisfactory than they were a year ago, the commissioners greatly regret to say that the same cannot be said of the internal system. A similar criticism was made in their first annual report (p. 42). It was then intimated that a reform was necessary in the whole method of internal transportation; the tariffs of different roads were compared, and gross and inexplicable variations in them found to exist; the system of delivery was pronounced defective; and

finally the corporations were called upon to themselves undertake the work of renovation, thus making unnecessary any attempt at governmental interference. At the close of another year, however, the commissioners are not aware of a single step taken even in contemplation towards the end indicated by them. It is, of course, impossible to regard such a result as in any way satisfactory, and it only remains for this board to sit down under a confessed inability to accomplish anything, or to have recourse to more definite language, and to suggest a more decisive line of action. Under these circumstances, and pursuing their investigations under the Resolve of the last legislature, the commissioners feel no disposition to shirk any responsibility or to avoid the issue presented.

The commissioners base their investigations and all their economical conclusions on this principle:—All sums exacted from the community for transportation, whether of persons or of property, constitute an exaction in the nature of a tax,—just as much a tax as water rates, or the assessments on property or the tariff duties on imports. That it is wholly, or in part, a necessary tax,—one which can at most only be reduced to a certain point, but never abolished,—this, in no degree, affects the principle. It is still a tax, adding in itself nothing to the intrinsic character of property, nor affecting the condition of persons, but simply moving the one or the other from point to point. The reduction of this tax to the lowest possible amount paid for the greatest possible service rendered, always observing of course the precepts of good faith and the conditions of a sound railroad system,—this must be the great object the commissioners retain always in view. Much is constantly heard of the importance of railroad charges as an element in the calculations of the Western agriculturist. Under this incessant discussion, and a spirited competition of trunk lines, the cost of transportation of Western produce to the seaboard has now been reduced to a point hitherto regarded as chimerical. During the last summer three mills per ton per mile has been attained, not unknown. The commissioners have no criticism to make upon this.

Any arrangement which enables the farmers of the West to successfully compete with the producers of the Danube and Black Sea is a subject of national rejoicing. The commiss

ers desire none the less to express grave doubts whether the transportation tax weighs as heavily after all upon a farming and agricultural region as it does upon a manufacturing district as peculiarly located as Massachusetts. It here appears in every possible shape ;—it is encountered at every step. It may safely be asserted that there is no branch of Massachusetts industry which is not carried on against competitors more advantageously located. The state has very few natural advantages ; but everything with her depends on the intelligence of the people and the cost of transportation. The West in producing cereals has at least a soil of unsurpassed fertility ; Pennsylvania in manufacturing iron has the ore and the coal in close proximity to the furnace ; [the English mill-owner has his power and his labor in cheap profusion. Almost every article, however, which enters into the industries of Massachusetts has to be brought within her limits from a distance. Her very water-powers are subject to inclement winters and dry summers, while she has to make her ingenuity supply a deficiency in labor. Her food is, then, brought from the North-West ; her wool and her leather from South America, Texas, California and the central states ; her cotton from the South ; her ores from the Adirondacks ; her coal from Pennsylvania ; her copper from Superior, and the list would admit of indefinite extension. Massachusetts is thus merely an artificial point of meeting for all kinds and descriptions of raw material, which is here worked up and then sent abroad again to find a consumer. At every point, coming and going and in process of manufacture, it has to be transported, and it has to bear all costs of transportation in competition with articles of the same description produced elsewhere and by others. Every reduction of the transportation tax acts, then, as a direct encouragement to the industry of Massachusetts, just as much so as if it were a bounty or bonus,—it is just so much weight taken off in the race of competition.

Such is the nature of the transportation tax ; it next remains to inquire as to its amount. The accompanying table (No. 8) shows the returns of the Massachusetts railroad system, as respects gross earnings during the last ten years. They are not entirely accurate for the purposes in view, inasmuch as many of the roads included, such, for instance, as the Boston &

Gross and Net Income of Railroads in Massachusetts from 1861 to 1870, inclusive, and estimated Income for Roads within the limits of Massachusetts, with the Amount of Taxes for State, County and Town purposes.

	Gross Income.	Net Income.	Estimated Income of Roads within Mass.	Total State, County and Town Taxes.
1861, .	\$9,016,149 12	\$2,916,411 80	\$7,032,596 34	\$7,600,501 00
1862, .	9,933,581 31	3,581,657 61	7,748,193 49	8,605,511 19
1863, .	11,950,739 28	4,424,157 42	9,321,576 70	10,599,097 22
1864, .	16,478,596 16	4,799,256 86	12,853,805 04	12,876,850 59
1865, .	18,974,914 66	4,942,661 93	14,800,433 58	9,199,830 79
1866, .	21,205,527 97	5,383,743 65	16,540,312 03	15,694,039 07
1867, .	21,561,060 96	5,492,565 64	16,817,627 76	19,104,074 79
1868, .	22,761,646 71	5,385,596 94	17,754,084 59	16,056,193 00
1869, .	24,539,722 00	5,926,613 88	19,140,983 16	20,007,863 00
1870, .	*25,003,952 82	*6,392,547 20	*19,503,083 20	21,922,569 00
Totals in ten years,	-	-	\$141,512,195 89	\$141,666,529 65

[illegible]

Maine, the Eastern, the Cheshire, and the Hartford & New Haven, return all their receipts, though but a small portion of their respective roads are within the state. A deduction of 22 per cent. is therefore made from the aggregate gross receipts of each year, as an allowance for this variation. Here then is a tax rising from \$7,032,596.34 in 1861, to \$19,503,083.20 in 1870, levied by the railroad corporations for services rendered the community in the way of transportation. An additional column in the table represents the entire state, town and county taxes levied during the same years. These figures should have a very grave importance to the people of Massachusetts. They certainly indicate that the existing production of Massachusetts, estimated at \$700,000,000 annually, pays on account of municipal taxation and transportation alone over \$40,000,000 per annum. While, for reasons hereafter stated, it will not do to press this analogy between the two taxes very far, yet these being two of the principal burdens under which production everywhere labors, it is very important to see how industry in Massachusetts is situated in regard to them, as compared with industry in other localities,—are its burdens here heavier or lighter than elsewhere? As regards the transportation tax it is almost impossible to derive any results of value from a comparison of statistics. This tax has one peculiarity in common with the tariff duties on imports,—the lower it is fixed, within certain limits, the larger in its aggregate it becomes. A large *per capita*, therefore, by no means indicates an oppressive scale of charges, but rather the contrary. Industry pays a large tax because the tax is fixed at a point which enables industry to pay it. For instance, the average contribution of each human being in the United States to the earnings of the railroad system is estimated by the best authority at about \$10 per annum.* Manufacturing communities always make much more use of their railroads than any other. Yet while the *per capita* in Massachusetts rises only to \$13.81 per annum, that in Pennsylvania rises to over \$20. This apparently is largely due to the fact that a single corporation in Pennsylvania, moving alone five-sixths as large tonnage as all the roads in Massachusetts combined, and

* Manual of Railroads of the United States, 1870. H. V. Poor. p. xxxvi.

xlii RAILROAD COMMISSIONERS' REPORT.

returning nearly as large an income,* makes this great
 ment at a charge per ton per mile of a little less than on
 of the usual charge on local movement in this state
 charges on the road referred to and on eight Massac
 roads are set forth in the accompanying table.

TABLE No. 4.
Average Rate per Ton per Mile in cents on Freight moved i

	Local Freight.	Throug
Boston, Clinton & Fitchburg,	6.15	5
Boston & Lowell,	7.15	2
Boston & Maine,	5.04	3
Boston & Providence,	8.42	4
Cape Cod,	8.53	4
Cheshire,	7.32	2
Eastern,	6.85	2
Fitchburg,	7.46	2
Norwich & Worcester,	4.40	4
Pennsylvania,	1.72	1

The Boston & Albany road should be included in the
 but unfortunately this company does not discriminate
 returns between earnings from through and local freight
 average charge per ton per mile on its entire freight mov
 in 1869, was 2.43, or 41 per cent. above that on the Pe
 vania road. No reliable conclusions, however, can saf
 drawn from such a comparison; that here drawn by th
 missioners is probably correct, but, while one state
 through produce or transit business, or a coal traffic, or a
 manufacturing population, which another has not, it is
 sible to argue certainly from the one to the other.

* The following are the exact figures in the two cases referred to

1869.	Tons carried.	Gross E
Pennsylvania Railroad,	5,402,991	\$17,250
Massachusetts Railroads, (total,)	7,378,083	24,534

Deducting from the totals of the Massachusetts system 22 per c
 representing the amount properly to be credited to portions of the
 lying in other States, the entire railroad system of Massachusetts
 will be found to return a tonnage movement of 351,914 tons, and
 earnings of \$1,890,172 more, than the Pennsylvania Railroad.

The case stated, however, fully serves to illustrate the distinction between the municipal and the transportation tax which the commissioners desire to point out. The larger the aggregate of the municipal tax, the heavier the burden imposed by it on the production of the state; while, on the contrary, the higher the total of the transportation tax rises the greater is the volume of business and the lower are the tariff rates probably indicated. The municipal *per capita* and the transportation *per capita* in Massachusetts are each about \$13.80 per annum; the first is 30 per cent. higher than the *per capita* of New York and 64 per cent. higher than that of Ohio, while, as regards cities, the *per capita* tax of Boston is 35 per cent. higher than that of New York, while that of Philadelphia is but 40 per cent. of that of Boston.

A sufficient reference has already been made to the *per capita* transportation tax in this state; so far as any deductions can safely be drawn in regard to it, it would seem to be nearer the average of the whole country than should be the case in so busy and thriving a community. In any event it is safe to say that, taking the two together, a very heavy and oppressive burden is imposed on the annual production of the state. To reduce it is simply to give the Massachusetts manufacturer an equal chance with others in the common market. Meanwhile, so far as the ultimate effect is concerned, in the impetus given to production, a reduction in the municipal tax or a reduction in the transportation rates operate in exactly the same way. A reduction on an average of 20 per cent. in existing railroad tariffs throughout Massachusetts would probably, though it might decrease net earnings, double gross earnings, which are the aggregate tax, and have much the same effect on the prosperity of the Commonwealth as doing away with the whole state tax.

With the municipal tax this board has no concern.* The

* In preparing this portion of their report the commissioners were most kindly and liberally furnished with statistics on the subject of taxation in this country and elsewhere, by the Hon. D. A. Wells, head of the commission on revision of the revenue laws of New York. As these figures will appear in the forthcoming report of the New York commission, it has not been judged necessary to use them here. They reveal, however, the startling facts, that, while on a *per capita* of taxation, Massachusetts is probably the most heavily taxed state in the Union, Boston is unquestionably the most heavily taxed city in the world.

figures concerning it are adduced here simply for purpose of illustration. The discussion of railway charges is of as much consequence industrially to a people as the ordinary question of taxation; but, in discussing it, the community should ever keep in view is, not to reduce the gross amount it pays, but so to regulate and dispose of the burden as to enable it continually to pay more. The commissioners desire, therefore, to remove in the outset any false, and perhaps popular impressions which may exist in regard to what they have here designated as the transportation tax. They are very far from implying or believing that it has been exacting for insufficient services rendered, or that it ought to be or ever be abolished. On the contrary, it is a payment which has been cheerfully made in compensation for services of inestimable value. Unless, however, both the nature and the magnitude of the burden are clearly understood, it will be impossible to appreciate the prodigious relief and impetus which any successful reduction of rates must afford to Massachusetts.

Before entering into the discussion as to what, if any, reduction is possible and how it could best be effected, it may be well to examine into what has been already done by the railroad commissioners looking in this direction. In order to do this the commissioners have gone back over a period of ten years. The subjoined table (No. 5) shows the rates, according to their own returns, at which several railroad corporations have transported passengers and tons of freight during each of the years between 1861-70. The results do not indicate any material reduction, and, in many cases, a decided increase. The table, however, is not satisfactory, as no distinction is made between through and local business as regards freight; and, as regards passengers, the package and season ticket business, which has vastly increased during the period taken, tends also to vitiate the results. With a view to arriving at a more exact comparison, the commissioners were very anxious to analyze the past returns, separating earnings between through and local business, and ascertaining what had been the charges for each. It was discovered, however, that certain corporations, particularly the Boston and Albany, whose returns they especially desired to analyze, failed to apportion their earnings in the method prescribed in the printed forms. The accompanying table, (No. 6) nevertheless

TABLE No. 5.

	FARE OF PASSENGERS PER MILE IN CENTS.										FREIGHT PER TON PER MILE IN CENTS.									
	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.
RAILROADS.																				
Boston & Albany,	2.06	2.66	2.62	2.71	3.11	3.07	3.03	2.72	2.64	2.77	2.43	2.58	2.75	3.01	3.55	3.16	2.98	2.81	2.43	2.20
Boston & Lowell,	2.32	2.43	2.48	2.60	2.85	2.74	2.72	2.52	2.43	2.29	4.13	3.50	3.75	4.63	4.52	4.75	4.59	4.59	4.67	4.29
Boston & Providence,	2.23	2.10	2.45	2.22	2.20	2.29	2.15	1.95	2.42	2.55	3.21	2.69	2.81	3.60	4.38	4.35	4.21	3.69	3.86	3.45
Fitchburg,	2.06	2.11	2.08	2.06	2.31	2.36	2.31	2.25	2.29	2.30	3.81	3.74	3.26	3.51	4.09	4.38	4.20	4.08	4.35	4.30
Old Colony & Newport,	2.46	2.45	2.43	2.43	2.43	2.41	2.48	2.17	2.29	2.27	3.09	3.24	3.20	3.24	3.19	3.49	4.92	4.04	4.60	5.15
Connecticut River,	3.41	3.05	3.22	3.33	3.28	3.34	3.13	3.33	3.22	3.15	5.03	4.79	4.84	5.04	6.19	6.12	6.03	5.24	4.91	4.58
Worcester & Nashua,	2.92	3.18	3.72	3.97	3.91	3.61	3.69	3.57	3.56	3.51	4.94	4.76	4.07	4.97	6.31	5.90	4.85	4.46	4.17	3.79

presents the charges in cents per ton per mile and per passenger per mile for through and local business on a number of the principal roads of the Commonwealth, according to the returns of 1860-65-70. This table verifies the support made as regards the previous one; there is no reduction where apparent except that in local passenger charges, which is due to the increased number of commuters, and in the freights, which is due to causes already referred to.

Wishing, however, to establish their position in this regard beyond possibility of question, the commissioners undertook to make a direct comparison of the tariffs on the roads named during the period mentioned. They experienced, however, great difficulties in doing this. No public board having existed prior to the last year, the Commonwealth had no records of its own on the subject. On applying to the corporations to supply good this deficiency, the commissioners were surprised to find that few, if any of them, kept any files of their old tariffs. It was only by chance and with great difficulty that enough could be produced to make a reliable comparison. The corporations, however, afforded every assistance in their power, and for the tariffs of six roads for 1860 and for 1865 were procured. With these the commissioners have compared with the tables of existing tariffs of the same roads printed in their first report. (See Tables Nos. 11-27, 28, in First Annual Report.) The result of the comparisons thus made will be found in the joined Tables, Nos. 7-8. This comparison establishes that, so far from any reduction having been made in their fares and freights by the railroads of this Commonwealth during the last ten years, a directly opposite course has been pursued. The tendency has been towards an increase, rather than a decrease, and the rates are to-day, as a whole, higher than they were in 1860.

As a contrast to this policy, and to lend force to the criticisms they propose to make upon it, the commissioners wish to call attention to the results of a different course pursued in Belgium during almost the same period. The Belgian railway system now aggregates 1,703 miles in a territory of 13,000 square miles of area, being a mile of railroad to each 7.6 souls in its population and to each 6.69 square miles of territory. Massachusetts has 1,491 miles in a territory of

TABLE No. 6.

RAILROADS.	PASSENGERS.				FREIGHT.				
	Rate per mile, in cents, on main road and branches.		Rate per mile, in cents, to and from connecting roads.		Rate per ton per mile, in cents, on main road and branches.		Rate per ton per mile, in cents, to and from connecting roads.		
	1860.	1865.	1870.	1860.	1865.	1870.	1860.	1865.	1870.
	1860.	1865.	1870.	1860.	1865.	1870.	1860.	1865.	1870.
Boston, Clinton & Fitchburg, .	-	-	2.37	-	-	3.61	-	-	5.21
Boston & Lowell,	-	3.99	2.52	-	1.11	2.09	-	2.67*	2.98
Boston & Maine,	2.13	2.56	2.12	1.63	1.78	2.16	5.44	5.13	3.43
Boston & Providence,	3.98*	2.31	2.42	.82*	2.04	2.41	5.74	5.07	4.54
Boston & Worcester,	2.12	2.42	-	2.46	2.57	-	5.75	6.29	-
Cape Cod,	-	2.83	3.55	-	3.10	3.74	-	10.68*	4.85
Cheshire,	3.75	4.06	4.78	3.49	4.52	4.37	5.96	7.23	2.86
Eastern,	2.32	2.58	1.90	2.44	2.91	2.45	5.23	5.38	2.56
Fitchburg,	2.16	2.40	2.36	1.98	2.17	2.13	6.48	7.51	2.72
Average,	2.51	2.76	2.18	1.74	1.95	2.61	5.29	5.52	2.90

* The commissioners are not responsible for the accuracy of the returns on which this table is based. In many cases the results would seem to indicate manifest errors and great carelessness in the methods of keeping accounts. No other statistics are, however, to be had, and until better are produced by increased care, these must be taken for what they are worth.

TABLE No. 7.

	Miles.	1860.		1865.		1870.	
		Fare.	Rate per mile, cents.	Fare.	Rate per mile, cents.	Fare.	
<i>Boston and Albany Railroad.</i>							
Boston to Albany,	202.10	\$5 00	2.47	\$6 00	2.92	\$6 00	
" to Pittsfield,	150 46	4 00	2.66	4 75	3.15	4 75	
" to Chapel Station,	2.80	10	3 57	10	3.57	10	
" to Longwood,	3.10	10	3.22	10	3.22	10	
" to Cottage Farm,	3	10	3.33	10	3.33	10	
" to Newtonville,	8.10	22	2.71	25	3.08	18	
" to Brighton,	5	15	3	15	3	15	
Cottage Farm to Allston,	1.12	-	-	5	4.46	5	
" " to Newton,	4	-	-	15	3.75	15	
Allston to Brighton, . . . . .	.88	-	-	5	5.68	5	
" to Newton,	2.88	-	-	12	4.16	12	
Brighton to Newton,	2	10	5	10	5	10	
Newtonville to West Newton, . . . . .	.90	10	11.11	5	5.55	5	
Auburndale to Rice's Crossing,	2.20	-	-	10	4.34	10	
Grantville to Wellesley,	1.30	10	7.69	10	7.69	10	
Natick to Lake Crossing,	1.30	-	-	10	7.69	10	
" to South Framingham,	3.80	15	3.94	15	3.94	15	
South Framingham to Ashland,	2.70	-	-	15	5.55	15	
Cordaville to Southville, . . . . .	.80	10	12.50	5	6.25	5	
Westborough to Southville,	3.90	15	3.84	15	3.84	15	
Worcester to Grafton,	6.20	20	3.22	25	4.03	25	
East Holliston to Holliston,	1	10	10	10	10	10	
" " to Metcalf's,	3	15	5	15	5	15	
" " to Bragg's,	5	20	4	20	4	20	
" " to Milford,	8	25	3.12	28	3.50	28	
Chapel Station to Longwood, . . . . .	.30	-	-	5	16.66	5	
<i>Boston and Lowell Railroad.</i>							
Boston to Wilton,	55	\$1 65	3	\$1 85	3.36	\$1 70	
" to Nashua,	40	1 20	3	1 35	3.32	1 25	
" to Lowell,	26	75	2.89	90	3.46	80	
" to Medford,	5	15	3	15	3	15	
Lowell to Middlesex,	1	10	10	10	10	10	
" to Chelmsford,	3	10	3.33	15	5	15	
Chelmsford to Tyngsborough,	3	10	3.33	15	5	10	
Tyngsborough to Little's,	4	10	2.50	15	3.75	15	
Winchester to E. Woburn,	1½	10	6.66	10	6.66	10	
Woburn to N. Woburn.	1½	10	6.66	10	6.66	10	
Chelmsford to Little's,	7	20	2.85	30	4.28	25	
Woburn to E. Woburn,	½	10	20	10	20	10	
Wilmington to Billerica and Tewksbury,	4	15	3.75	15	3.75	15	
<i>Connecticut River Railroad.</i>							
Springfield to South Vernon,	50	\$1 70	3.40	\$1 90	3.80	\$1 90	
" to Greenfield,	36	1 25	3.47	1 35	3.75	1 35	
" to Chicopee,	3.50	10	2.85	10	2.85	10	
" to Chicopee Falls,	6	15	2.50	15	2.50	15	
Chicopee to " "	2.50	5	2	5	2	5	
" to Willimansett,	3.50	15	4.28	15	4.28	15	

TABLE No. 7—Concluded.

		1860.		1865.		1870.	
	Miles.	Fare.	Rate per mile, cents.	Fare.	Rate per mile, cents.	Fare.	Rate per mile, cents.
<i>Connecticut River R. R.—Con.</i>							
Willimansett to Holyoke, . . .	1	\$0 10	10	\$0 10	10	\$0 10	10
Holyoke to Smith's Ferry, . . .	5	15	3	20	4	20	4
Smith's Ferry to Mt. Tom, . . .	2	—	—	—	—	10	5
Northampton to Hatfield, . . .	4	15	3.75	15	3.75	15	3.75
Greenfield to Bernardston, . . .	7	25	3.57	25	3.57	25	3.57
Bernardston to South Vernon, . . .	7	25	3.57	30	4.28	30	4.28
Deerfield to Greenfield, . . .	3	10	3.33	10	3.33	10	3.33
<i>Fitchburg Railroad.</i>							
Boston to Fitchburg, . . .	50	\$1 50	3	\$1 55	3.10	\$1 55	3.10
" to Groton Junction, . . .	35	1 05	3	1 10	3.14	1 10	3.14
" to Concord, . . .	20	60	3	65	3.25	60	3
" to Waltham, . . .	10	30	3	30	3	25	2.5
" to Belmont, . . .	6	20	3.33	20	3.33	17	2.8
Groton Junction to Shirley, . . .	5	15	3	15	3	15	3
" " to Leominster, . . .	11	35	3.18	35	3.18	35	3.18
" " to Fitchburg, . . .	15	45	3	45	3	45	3
" " to West Acton, . . .	8	30	3.75	30	3.75	30	3.75
" " to South Acton, . . .	10	35	3.50	40	4	40	4
Lincoln to Concord, . . .	3	15	3	15	5	15	5
" to South Acton, . . .	8	25	3.12	25	3.12	25	3.12
Belmont to Waverly, . . .	1	—	—	10	10	10	10
Boston to Cambridge, . . .	3	10	3.33	10	3.33	10	3.33
Stony Brook to Weston, . . .	1	10	10	10	10	10	10
" " to Lincoln, . . .	5	15	3	20	4	20	4
" " to Waltham, . . .	2	10	5	10	5	10	5
Shirley to Leominster, . . .	6	20	3.33	20	3.33	20	3.33
<i>Worcester and Nashua Railroad.</i>							
Worcester to Nashua, . . .	46	\$1 50	3.26	\$1 75	3.80	\$1 75	3.80
" to West Boylston, . . .	9	25	2.77	30	3.33	30	3.33
West Boylston to Oakdale, . . .	1	10	10	10	10	10	10
Oakdale to Sterling Junction, . . .	2	10	5	15	7.50	15	7.50
Sterling Junction to Clinton, . . .	5	20	4	25	5	25	5
Clinton to So. Lancaster, . . .	1	10	10	10	10	10	10
So. Lancaster to Lancaster, . . .	1	10	10	10	10	10	10
Lancaster to Still River, . . .	4	20	5	20	5	20	5
Still River to Harvard, . . .	2	10	5	15	7.50	15	7.50
Harvard to Groton Junction, . . .	3	10	3.33	15	5	15	5
Groton Junction to Groton Centre, . . .	3	15	5	15	5	15	5
Groton Centre to Pepperell, . . .	5	20	4	20	4	20	4
Pepperell to Hollis, . . .	3	15	5	20	6.33	20	6.33
Hollis to Nashua, . . .	7	20	2.85	25	3.57	25	3.57

TABLE No. 8.—Rates of Freight, per Ton of Two Thousand Pounds.

RAILROADS.	1860.				1865.				1870.				
	Miles.	1st Class.			4th Class.	3d Class.	2d Class.	1st Class.	4th Class.	3d Class.	2d Class.	1st Class.	
<i>Boston and Albany.</i>													
Worcester to Millbury,	9	\$1 40	\$1 20	\$1 00*	-	-	-	-	-	-	\$1 40	\$1 20	\$1 00
Boston to Framingham,	21	2 40	1 60	1 40*	-	-	-	-	-	-	2 40	1 80	1 40
Boston to Worcester,	44	3 00	2 40	1 80*	-	-	-	-	-	-	3 00	2 40	1 80
Springfield to Indian Orchard,	6	1 60	1 40	1 20	\$1 00	\$1 60	\$1 40	\$1 20	\$1 00	1 80	1 60	1 40	1 20
Worcester to East Brookfield,	20	2 00	1 80	1 60	1 40	2 00	1 80	1 60	1 40	2 40	2 20	1 80	1 60
Boston to East Brookfield,	64	4 20	3 20	3 00	2 40	4 20	3 20	3 00	2 40	4 20	3 40	2 80	2 40
<i>Fitchburg.</i>													
Boston to Waltham,	10	1 00	1 00	90	-	1 10	1 00	1 00	1 00	1 50	1 40	1 30	90†
South Acton to Fitchburg,	25	2 00	1 25	1 00	-	2 50	2 10	1 90	1 60	2 70	2 50	2 00	-
Boston to Fitchburg,	50	3 00	2 50	2 25	1 75†	3 30	2 90	2 60	2 00	3 60	3 20	2 80	1 55†
Groton Junction to Fitchburg,	15	1 30	1 00	97½	-	1 60	1 40	1 30	1 10	2 00	1 80	1 50	-

† Coal.

TABLE No. 8.—Concluded.

RAILROADS.	Miles.	1860.			1865.				1870.				
		Special.	1st Class.	2d Class.	1st Class.	2d Class.	3d Class.	4th Class.	1st Class.	2d Class.	3d Class.	4th Class.	
Connecticut River.													
Holyoke to Springfield,	8	\$1 20	\$0 90	\$0 70	\$1 80	\$1 40	\$1 10	\$0 90	\$1 60	\$1 20	\$1 00	\$0 80
Holyoke to Greenfield,	28	2 80	2 20	1 80	4 40	3 20	2 80	2 40	3 00	2 60	2 20	2 00
Springfield to South Vernon,	50	3 60	3 00	2 80	5 20	4 00	3 60	3 40	4 20	3 60	2 80	2 40
Springfield to Hatfield,	21½	2 00	1 60	1 40	3 20	2 40	2 20	1 80	2 20	1 80	1 60	1 40

RAILROADS.	Miles.	1860.			1865.				1870.				
		1st Class.	2d Class.	3d Class.	1st Class.	2d Class.	3d Class.	Coal.	1st Class.	2d Class.	3d Class.	Coal.	
Boston and Lowell, &c.													
Boston to North Woburn,	11½	\$1 00	\$0 80	-	\$1 40	\$1 20	-	-	\$1 40	\$1 20	-	-
Boston to Lowell,	26	1 60	1 40	\$1 25	2 20	2 00	\$1 80	\$1 50	2 20	2 00	\$1 80	\$1 50
Lowell to Groton Junction,	17	1 20	1 00	-	1 80	1 60	-	-	1 80	1 60	-	-
Boston to Tyngsborough,	32	2 00	1 80	1 50	2 60	2 40	2 00	-	2 60	2 40	2 00	-

square miles of area, being a mile of railroad to each 971 sq in its population, and to each 5.23 square miles of territory. Both are manufacturing communities, and, though the population of Massachusetts is less dense than that of Belgium, it is far more disposed to move from place to place. So much is this the case, that in spite of the reduced rates in use in Belgium, and the more than twofold population there, in 1861 the railway system carried only 23,607 passengers for each mile of road, as against 19,700 per mile for the same year on the Massachusetts roads. In regard to freight, however, the case is different. The Belgian roads in 1866, transported 12,211 tons per mile of road, while the Massachusetts roads transported only 4,948. There are, therefore, no fundamental differences as regards physical or economical or industrial conditions which should cause the experience of the one community to be wholly inapplicable to the other.

In 1856, in spite of a considerable increase in the miles of railroads worked, the freight movement of the Belgian roads was found to have seriously decreased. Instead of making up the deficiency in receipts by increased rates on existing business, the administration met the emergency by accepting all traffic that offered at greatly reduced special rates. This policy succeeded so well that in 1861 the principle was adopted as regular for minerals and raw materials of a regular low scale of charges with a reduction according to distance. This resulted in the following year in an increase of 72 per cent. in the tonnage of this class of goods. In 1862 the principle was extended to goods of the next class with similar results. In 1864, freights were re-classified and the new principle applied to all except the first class, or small parcels, which in this country are known as express matter.* The result was summed up by the Minister of Public Works as follows: "In eight years, between 1856-64, the charges on goods have been lowered, on an average, by 28 per cent.; the public have sent 2,706,000 tons more goods, while they have actually saved more than \$400,000 on the cost of carriage, and the public treasury has e

* The Belgian tariff is quite complicated, and it is not deemed expedient to endeavor to analyze it here. Meanwhile the following comparison of charges made on English and Massachusetts roads with what they would be under the Belgian tariff, will perfectly illustrate the practical v

an increased net profit of \$1,150,000." A further reduction, made subsequently to this statement, in 1864, exceeded even these results, and under it the tonnage rose from 4,479,000 tons in 1863, to 6,533,000 in 1864.

In 1865, the government, encouraged by these results, turned its attention to fares, now applying to them the principles before applied to freights. A general scale was adopted, in which the charge per mile was diminished in proportion to the length of the journey over 22 miles. For distances less than 22 miles the old rates were retained, varying between 1.2 and 2.5 cents per mile, according to the class of carriage. Above the 22 miles the rates rapidly decreased until the fares for distances over 155 miles were as low as one cent per mile for first class, and seven mills per mile for second class tickets. Under this system the fare from Boston to Albany, for instance, would be respectively \$2, \$1.40, and \$1, according as it was paid for a first, second or third class ticket. The effect of this change was a singular and very striking illustration of the immediate influence of any reduction of rates on the volume of travel. The traffic within distances of 22 miles, on which no reduction was made, scarcely increased at all. Between 22 and 46 miles, on which distances the reduction was small, it increased only 20 per cent., while on distances over 46 miles, on which a heavy reduction was made, it nearly doubled.

The commissioners regret very much that the more recent official documents relating to these experiments are not now

of the system. The English and American charges are those in use on existing corporations, and between specified termini selected at hap-hazard. The Belgian charges are computed.

ARTICLES TRANSPORTED— PER TON.	Distance in Miles.	RATE.		
		English.	Massachu- setts.	Belgian.
Butter,	32	\$2 40	\$2 00	\$1 16
Lumber, (1st road,)	35	2 16	2 60	82
“ (2d road,)	39	2 40	2 20	88
“ (3d road,)	65	3 00	2 80	1 20
Sugar,	100	3 90	5 00	2 90
Groceries,	116	5 60	5 80	3 30
Hardware,	116	6 60	5 80	3 24
Pig Iron,	126	3 60	3 80	1 44
Bar Iron,	130	4 60	4 60	2 16
Earthenware,	150	7 20	5 80	2 16

within their reach. They cannot be found in any of our public libraries, and the commissioners have not yet succeeded in procuring them from abroad. Their knowledge is, therefore, derived at present from second sources, and any further statement of results would not be free from doubt.

If such, however, have been the results of a bold system of reduction elsewhere, the question naturally suggests itself. Are those tariffs which have so long existed on our Massachusetts roads the lowest at which they could be operated at a profit, no matter how much their volume of business was increased? If they are, how does it happen that the conditions affecting transportation are so different here from those found to exist in other, and not dissimilar communities? If these questions were put to the railroad officials, they would probably answer by referring to their returns; they would show that under their present tariffs, the roads could not earn the alloted ten per cent. dividends, and were often unable to supply the means necessary to meet the requirements of an increased business.

Such an answer could not be considered satisfactory. A similar one was persistently advanced against all reductions in the case of high postage. It wholly ignores the recent experience of the corporations themselves as regards certain deductions of through business, in which low rates have so stimulated transportation that the railroad managers themselves are unable to say where profit ceases and loss begins. That certain companies have been losers at the rates under which they have carried cannot well be denied; but that any company has been so by carrying through freights at 25 per cent. of the average charge for local freights in Massachusetts is extremely doubtful. Under these circumstances the commissioners wish very much to set forth their views as to the policy which the corporations should adopt as regards this important question;—that it should be a tentative, but a persistent one,—a continual experiment to see when and how and where any portion of the burden pressing on industry could be so removed or so shifted as to enable production to expand, thus replacing in one direction what was conceded to it in another. The commissioners can make no sacrifice of dividends; they do ask for a constant exercise of ingenuity and for a sacrifice of ease. The community

right to demand increased facilities from its corporations, even though it may not promise any increase of net earnings in return, provided only such new facilities do not involve an actual and decided loss.

The commissioners believe they speak within safe bounds when they express the opinion that an average immediate reduction of 10 per cent., with an ultimate and not very remote reduction of 30 per cent., could be made throughout the railroad tariffs of the state without permanently reducing net earnings in any appreciable degree. The increased business would, within a very limited period, more than make good the reduction, provided of course that such reduction was judiciously and skilfully made. Not a few railroad managers, however, frankly say that they do not care for this or that business; that it is not remunerative; that they do not see the object of a policy which could only compel the corporation to do twice as much work with no increase, and perhaps even a perceptible diminution of net income. From the employé point of view this argument is certainly entitled to great weight. The commissioners, however, while they do not propose in any way or at any time to suggest interference with the reasonable, and even liberal net earnings of the companies,—while they are confident that no thought of so doing exists either in the legislature or the community at large, yet, at the same time, they are not disposed to attach weight to considerations such as those referred to. Very valuable charters, and privileges practically exclusive, have been conferred on these corporations upon one single consideration,—that, as trustees, they should watch over the interests confided to them, and that, as public servants, they should zealously perform all duties within the sphere of their functions. The dividends were to be a compensation for the performance of these duties. The community has certainly fulfilled its part of the contract, both in the letter and in the spirit, but the tables already presented would seem to indicate that the corporations have taken a more literal view of their responsibilities. They have, it may be inferred, been disposed, so to speak, to leave well enough alone, ignoring the fact that nothing was to be considered “well enough” which admitted of improvement.

The commissioners cannot ask a corporation to carry on any

branch of transportation at a direct and acknowledged loss. To do so would be to place themselves in an apparently vulnerable position. Yet they do not hesitate directly to assert, they intimated a year ago, (First Annual Report, pp. 38-39) that there are many articles of raw material which a railroad policy should induce the Massachusetts corporations to transport without any profit, if not even at a direct loss. The point exactly in question is presented in the movement of provisions. Prominent railroad officials have assured members of this committee that, though of late often carrying food at a loss,—“fail to get back a new dollar for an old one,”—they had yet done any business at once so rich in results both for their shareholders and the community. They had built up a local trade,—living cheap along their routes,—and, from the regular and multifarious demands of those thus made dependent on them, they had replaced many fold their loss on the carriage of articles of prime necessity. If this has proved true of food, why should it not also prove true as regards coal and other raw material generally? Indeed the commissioners hesitate to express it as their opinion, that a large view of their own interests should induce every railroad corporation in the state to offer at once a standing reduction of at least one cent. from regular tariff rates on the carriage of all articles certified as raw material for manufacturing purposes, to be taken at points on the line of their roads. This course would build up a busy community, wholly dependent on any corporation which fostered it. As already stated, the average payment to the railroads by each human being in Massachusetts is \$13.81 per annum. Where, then, a railroad builds up an industry, it simply increases the number of those who contribute to its treasury \$13.81 each year ;—the railroad then has a more direct interest in manufacturing development than any other portion of the community. Why, with these facts before them, the corporations insist, as they do, upon exacting profit from every form of carriage of raw material, the commissioners are wholly at a loss to understand. They would not get a profit if they carried it for nothing. The committee can only say that, in their opinion, the policy generally pursued in this respect is singularly short-sighted and shallow, and cannot, however, of course, suggest any legislation capable of remedying it.

to compel corporations to benefit themselves by operating at a loss.

If the conclusions to which the commissioners have come are correct, it manifestly becomes of great moment to know what prospect there is of their practical adoption by the railroad companies. Nothing has come to the knowledge of this board which encourages its members to hope that recommendations now made by them will be followed by any more practical results than those made a year ago. The corporations are naturally wedded to their existing modes of doing business, and look with justifiable distrust on measures of reform emanating from without. The commissioners on the other hand can give them no absolute assurance that the changes they suggest may not result in disaster. Under these circumstances it only remains to devise some method, other than simple recommendation, of effecting the desired result. The commissioners desire, therefore, at this time, to recommend a more definite line of public action to the legislature, and one which can be adapted to any emergency. In doing this, however, they do not wish to create the impression that any immediate exigency exists,—that it is necessary, or even desirable for the community to incur any unusual risk. On the contrary, the present is a time peculiarly appropriate in which to originate a policy, for it can now be done under conditions involving no haste and free from all excitement. The Commonwealth is increasing in wealth and population,—industry is remunerative,—the workshops are busy. If this condition of affairs is to be permanent, however, it is necessary to husband every resource and to remove every unnecessary burden. The present, therefore, being a period of preparation, the commissioners accept it as one very favorable in which to bring forward this delicate question. Watching the development of public experiments, the corporations can enjoy an ample leisure in which to make up their minds as to the course they prefer to pursue, while the Commonwealth, cautiously advancing, need commit itself to no heavy expenditure or untried theory.

There are then two questions on which this board now feels called upon to express opinions:—1st. How can the existing corporations most effectually be brought into a close sympathy with the wants of the community and the popular expecta-

tions ?—and, 2d. In case of the failure of all attempts to this close sympathy, how can the community be most prepared to substitute a new and more satisfactory system of management for that now existing ?

These questions were somewhat considered during the session of the last legislature. A law was passed declaratory of the general right of the legislature to regulate at its discretion the tariffs of fares and freights on the several railroads of the Commonwealth, without regard to the amount of net earnings. The commissioners are unable to see how any satisfactory results can be arrived at through action under this law on the grounds on which they base this impression can be expressed in very few words. All legislation in the direction indicated may be either general or special,—general as applying to all railroads of the Commonwealth, or special as applying to any individual one of them. No general law of this nature has yet been framed adequate to meet the wants of the case. Several attempts at it have frequently been made ; nor, indeed, do the commissioners now see how such a law could be framed. That it is here meant to imply that the regulation of railroads by law is impracticable, but the doubt is confined to the regulation in this particular way. Other methods have been suggested hereafter will be suggested, and their practical merits will be ascertained after trial ; this method has, however, been tried and with a uniform result. The cause of the difficulty in this case is indeed most apparent. A general law regulating fares and freights, which would very slightly touch one railroad would inevitably ruin another ; a tariff which would apply to all classes of articles, would be simply ridiculous when applied to all. The law found generally on the statute books provides a certain *sum* per mile for each passenger and for each ton of freight. A law on this principle framed to meet the case of the Boston & Albany road, by materially reducing its present rates, would ever result it might produce on that company, would send the Housatonic road into insolvency ;—a law which allowed the Housatonic to earn a dividend would be an application to the Boston & Albany. So of despatch freights ;—a rate per ton per mile applicable to coal would produce results eminently unsatisfactory to the community if applied to feathers, wicker-work, wood

household furniture. It is, however, useless to discuss this question ;—a general law which shall meet the circumstances of all the separate roads and provide for all classes of freights, degrees of speed and arrangements for comfort is a practical impossibility. It may, however, be urged that the law of 1870, (chap. 325, § 1) was intended to pave a way for special legislation to meet individual cases. This is very probably the case ;—at the same time, should the legislature undertake to follow out the plan indicated, and to specifically regulate the tariffs of each railroad of the Commonwealth, according to its particular circumstances or the needs of its surrounding community, it will launch itself into an ocean of special legislation such as has never yet been attempted, and no large legislative body could successfully attend to. Should it delegate a power in this regard to the present or any other board of commissioners, it would simply destroy it by so doing. A responsibility would be imposed unsustained by any executive power. An authority to regulate fares and freights over roads owned, controlled and operated by others, would place those in whom such authority was reposed in an entirely false and impossible position. Those managing the roads could produce what results they saw fit ; they could easily demonstrate, by apparent practical workings, the absurdity of anything which was distasteful to them. They could reduce to real failures the most correctly reasoned theories. It is useless for the legislature to look for satisfactory results from the labors of any board which can only work through reluctant agents, and the position of one who can direct but cannot execute is in the last degree unfortunate. It resembles nothing so much as that of a military commander, all of whose subordinates feel a direct and lively interest in his failure.

For these reasons, the commissioners do not believe that the desired relief lies in the direction towards which the legislation of last winter pointed. They believe it does lie in a directly opposite direction. The course they would recommend is the following :—let the state adopt its own plan of railroad management, wholly independent of the private railroad corporations ;—how this plan should, in the opinion of the commissioners, be developed, will be set forth in the subsequent part of this report ;—having done this in such a manner as to commit itself

to the least possible expense consistent with a perfect trial of a great experiment, recognizing it simply as a tentative effort. The state then give the existing corporations distinctly to understand that the continuance of their corporate existence depends wholly on (1) the results of the experiment in operation on their own success in the process of competitive development side by side with it. All restraints should then be removed from the private corporations; they should be allowed, within the limits of the law, to freely follow their own device. The two systems would thus be compelled to work their way out, in a visible and perfect contrast, and that which, at the expiration of a reasonable term of years, should prove itself to be the better, would undoubtedly be adopted with general acquiescence. The corporations, however, should not hereafter have it to say that they were trammelled or tied down during the period of the experiment. The principle of private corporate management should be in full play, while it distinctly understands that it is on probation.

Whether the corporations should hereafter meet the expectations of the community, or should fail to do so, the commissioners would recommend that the state should be prepared to take its own course. The commissioners do not propose in this connection to discuss the question of state ownership of railroads. There are arguments, based both on theory and experience, in favor of it and opposed to it. In this country it has not hitherto been attempted with success, but it is not clear that failure did not arise from the effort to construct railroads and to originate a system of management of them; nor, indeed, was failure confined to public enterprise. It is a matter of notoriety that all the early railroad enterprises in private hands passed through long periods of depression and financial tribulation. There are also various political considerations involved. The principle upon which our government is founded,—that of least possible governmental interference and largest possible individual initiative,—has a strong hold on the popular mind. The opinion of the Commonwealth unquestionably accords with a great reluctance any measure calculated to bring railroads and enterprises within the influence of politics. At the same time, a strong and growing popular conviction cannot be denied that railroads and internal communication constitute

tion to this general rule. The success which has attended an opposite policy in Belgium, and the experiments now in progress in Great Britain, have by no means escaped notice. The political considerations involved do not however fall within the province of this board ; it is for the commissioners simply to recommend that course which is, in their opinion, best calculated to certainly and safely reduce the transportation tax ; and it is for the people and their direct representatives to decide whether the advantages likely to flow from that policy are or are not counterbalanced by the dangers to our political system involved in it. The problem before the commissioners is a purely material one, and it is for another tribunal to weigh ulterior and political considerations. The commissioners do not therefore propose to argue these questions or to commit themselves to any opinions in regard to them. Neither, on the other hand, are they disposed to recommend anything rash or sweeping ; but, while they do not wish to destroy the old until the new is established, the new can only be confidently pronounced either a success or a failure after a fair course of experiment. There is nothing to prevent private ownership and state ownership of railroads from existing at the same time in the same community. They have always existed and still do so exist in Belgium. According to the statement of M. Fassiaux, at the time Belgian director-general of Posts, Railways and Telegraphs, made to the British Royal Commission on Railways of 1868,* there were on January 1st, 1864, 1,247 miles of railway in Belgium. Of this amount, 847 miles had been constructed and were worked by the state, belonging to it without reserve. The state derived the profit or suffered the loss (as the case might be) resulting from the working. In addition to this, 117 miles, constructed by private companies and worked by the state, were likewise the property of the state, though a proportion of receipts was paid over to the companies who constructed the roads, as the remuneration for work done. The remaining 780 miles were both constructed and worked by private companies, free from public control. The practical operation of the mixed system of ownership thus existing in Belgium might reasonably be expected to somewhat reproduce

* Minutes of Evidence, Qu. 3,058 ; also, Appendix M.

itself in Massachusetts. Of it M. Fassiaux said in the examination already referred to, "the state railways thus (through a mixed system of ownership) find themselves placed in constant comparison with the railways worked by private companies; on the one hand stimulating them to general improvements, and on the other hand acting as a sort of check against any attempt to realize extravagant profits at the cost of the public." These are the identical effects which the commissioners desire to see produced in Massachusetts. Instead, however, of expressing them as something which might be anticipated, they are here quoted as the actual conclusions of a long experience.

Actuated by these considerations, the commissioners would therefore suggest that the time has come for a practical attempt at the ownership of railroads by the state, and their management with a direct view to the interests of the public. They would therefore recommend that the legislature, under its reserved power, take measures to immediately assume possession of some line of railroad within the limits of the Commonwealth. The next question is,—Where and under what circumstances can the experiment most advantageously be tried?—Which of its roads can the state most advantageously assume? Numerous considerations would tend to influence a recommendation on this point. It is highly desirable that the road upon which this delicate experiment is to be tried should be wholly within the jurisdiction of Massachusetts; it would not be wise to imperil such a movement through the possible jealousy of one state at the ownership of a railroad within its borders by another state. Here in fact lies the great difficulty in the way of state ownership,—a difficulty which no one yet has endeavored theoretically to meet. Massachusetts would certainly be very unwilling to see the state of New York assume possession of the Boston & Albany under some clause in the West Stockbridge & Albany charter, and proceed to manage that road "by the people of New York for the people of New York;" and so Connecticut and New Hampshire might not impossibly entertain a similar jealousy as regards roads partly within their limits. Whether this should prove to be the case or not, however, it is very desirable that so serious and wholly unnecessary a risk should not endanger a mere preliminary experiment. In that experiment,

at least, while there are railroads wholly within the limits of the Commonwealth, there need be no question of jurisdiction involved. The next consideration is one of expense. It is not, in the opinion of the board, advisable for the Commonwealth to involve itself too deeply at once in a novel experiment. There are in the state several roads of limited size and cost which would include every desired condition, and the possession of which could not entail any very serious loss or inconvenience, even in case of failure. In case of success, however, it is very desirable that the experiment should admit of a natural and indefinite expansion in the directions in which it was commenced,—an expansion, indeed, in the nature of a natural growth or development.

All of these conditions are perfectly supplied in the case of only one of the railroads of the Commonwealth,—that between Boston and Fitchburg. This road lies wholly within our jurisdiction ; it could be assumed by the state for a moderate sum ; in case of failure it could be disposed of without serious loss or public inconvenience ; and, finally, in case the experiment resulted in success this route admits of indefinite expansion. In the last respect there is a peculiar propriety in selecting this road as the one on which to try the proposed experiment. The Hoosac Tunnel it is now confidently stated will be completed before the year 1874. It has been constructed solely by the public money, and it would be eminently fitting that, when completed, it should be managed solely in the public interests. By January, 1874, the experiment of state ownership and of public management would be so far advanced that a judgment could be formed as to the expediency of extending it. Were that judgment favorable, the rest of the line to Troy could then be assumed and any question of state jurisdiction would thus be deferred until the preliminary experiment was an approved success, and then it must necessarily present itself. Were the results still encouraging and were this difficulty overcome, the state road, commencing with the present 51 miles of the Fitchburg corporation, developing without undue haste and with no unnecessary assumption of risk or disregard of delicate interests, would in time place Massachusetts in direct communication with the Canadas, the West and the Middle States ; through the northern railroad system and Lake Champlain it would receive

the breadstuffs of the wheat-growing region and the ores of the Adirondack ; through the channels of the Delaware & Hudson Canal Company, it would communicate directly, both by water and rail, with the coal-fields of Pennsylvania. No other route in Massachusetts so properly and undeniably belongs to the community,—for this route the tunnel will create, and the Commonwealth made the tunnel ; in assuming it she would assume but her own. The commanding position of the line in the future is now scarcely appreciated ; towards the north and north-west it has all the advantages of the Boston & Lowell road ; towards the west and south-west all those of the Boston & Albany ; situated between the two, it could bring to bear a direct competition on each, and thus at once practically regulate the whole railroad system of the Commonwealth.

The commissioners would, therefore, recommend the legislature to take immediate steps towards assuming possession of the Fitchburg Railroad. While making this recommendation they do not propose to enter into particulars as to the steps involved in carrying it out, or to report any draught of a bill. These, however, as well as the main subject, have been matters of anxious and careful consideration with them. Should the legislature or the committee on railways be disposed to proceed in the path indicated, the services of the commissioners will be at their command. A very few days, it is believed, will suffice to mature all necessary legislation. Until, however, there is some indication that this is desired, and until the general subject can receive the consideration of the committee, the commissioners have not felt disposed to encumber this report with details. They propose only to offer a general sketch of a policy.

On two points, however, they desire at the start to place their opinions on record, and to remove all possibility of misconception.

1. As regards the rights of the present owners of the Fitchburg Railroad Company.

2. As regards the question of state management.

The commissioners cannot entertain a doubt that, in so far as the rights of private property are concerned, they will be guarded with great jealousy in any legislative action which may be had. Not only should the letter of the law be conceded, but in all doubtful cases the Commonwealth should decide

against itself. It should be remembered that the stock certificates of these railroads are not only the title-deeds of property, but the patents of public benefactors. They represent private means supplied to carry out a great public enterprise surrounded in its early days by doubt and risk. It may now be advisable to resume the ownership of the enterprise, but it is especially fitting that every reasonable claim of the present owners should be met in a spirit both of justice and liberality.

The Fitchburg Railroad Company now owns, in main and branch lines, 93.23 miles of track, with 50 miles of double track and 26 miles of siding, being in all, as near as may be, 169 miles of single track. This property is represented by \$3,640,000 in stock, the corporation being free from all indebtedness and having a balance of \$501,230 in its treasury. Computed in the usual method, the road would be said to stand at an average cost of \$38,000 per mile, as represented by all outstanding evidences of property.

There are three methods by which the state can take possession of the franchise and possessions of this company, viz. :

1st. Under section 84 of chapter 39 of the Revised Statutes which provides that "the Commonwealth may, at any time during the continuance of the charter of any railroad corporation, after the expiration of twenty years from the opening of said railroad for use, purchase of the corporation the said railroad and all the franchise, rights and privileges of the corporation, by paying them therefor, such sum as will reimburse them the amount of the capital paid in, with a net profit thereon of ten per cent. per annum, from the time of payment thereof by the stockholders to the time of such purchase."

2d. Under the declaratory Act of the last legislature (Acts 1870, chap. 325, § 2), which provides that "the Commonwealth may at any time take and possess the road, franchise and other property of any railroad corporation after giving one year's notice in writing to such railroad corporation, and paying therefor such compensation as may be awarded by three commissioners, who shall be appointed by the supreme judicial court, and shall be duly sworn to appraise the same justly and fairly. Said commissioners shall estimate and determine all damages sustained by any such railroad corporation by such taking of the road, franchise and other property thereof, and any such cor-

poration aggrieved by the determination of said commissioners may have its damages assessed by a jury of the superior court in the county of Suffolk, in the same manner as is provided by law with respect to damages sustained by reason of the laying out of ways in the city of Boston."

3d. In the usual business manner pursued by individuals and corporations in similar cases, through negotiation and purchase as has been done in the case of the telegraph system by the Parliament of Great Britain, and is proposed as regards the railroads of Ireland.

If the Commonwealth took possession under the method first stated it would be necessary to compute the excess of interest at ten per cent. over the dividends actually paid by the corporation since it was organized. The commissioners have not verified the figures contained in the report of the commission on cheap transportation to the legislature of 1870 (p. 68), but assuming them to be correct, the amount of dividends now in arrear appears to be between 92-3 per cent. of the capital, amounting to a total of \$3,357,000, aggregating, together with the stock capital, almost exactly \$7,000,000; or, otherwise stated, the road, if purchased in this way, would cost the Commonwealth in the immediate neighborhood of \$75,000 per mile, or \$192 per share. As the stock now commands a market price of \$136-7, any arrangement of this nature would certainly constitute no hardship on the shareholders.

In this connection it is of interest to see what, on the same basis of computation, would be the cost to the Commonwealth of its other leading railroads. According to the tables already referred to, the cost of the Boston & Maine would be \$146 per share, or in round numbers, \$80,000 per mile; that of the Eastern, \$177 per share, besides a bonded debt of \$3,037,400, amounting to about \$104,000 per mile; that of the Boston & Lowell, \$180 per share, besides a bonded debt of nearly \$255,000, amounting to about \$113,000 per mile; that of the Boston & Providence, \$185 per share, amounting to about \$105,000 per mile; that of the Old Colony, \$167 per share, besides a funded debt of \$2,986,600, amounting to \$79,000 per mile. Owing to the consolidation of the Boston & Worcester and the Western Railroads, and the complicated questions involved, it is very difficult to estimate the excess of interest over dividends due on the stock of the Boston & Albany. It is, how-

ever, not unsafe to say that, at the time of consolidation, a deficiency of \$2,415,000 existed as regards the Boston & Worcester, and \$1,400,000 as regards the Western, aggregating \$3,815,000, without including the stock dividend of 1868. The present capital and indebtedness of the consolidated road is not less than \$21,000,000, making an aggregate in the neighborhood of \$25,000,000 on 250 miles of road, or \$100,000 per mile. Even, therefore, through the extravagant method provided in the original Act, the Fitchburg road would seem to be in its cost per mile the cheapest in the state for the Commonwealth to assume.

The commissioners are unwilling to commit themselves to any estimate as to the value of this road should the Commonwealth desire to possess itself of it in the method prescribed in the Act of 1870. It is wholly impossible to say what rule or measure of damages the commission or court would lay down in the premises. If the actual present value of the property, or the cost to replace it as it stands, was the measure, it is impossible without long examination to say what that would amount to. It would, undoubtedly, largely exceed the average of \$38,000 per mile, at which their road nominally stands on the books of the company. It would, probably, considerably exceed the present market value of the stock, but the commissioners can form no reliable estimate whether it would exceed or fall short of the \$75,000 per mile arrived at through the computations heretofore made.

The other, and in the opinion of the commissioners, the most judicious method to pursue, is that through negotiation and purchase, reserving the statute methods as a final resort. This method avoids all litigation and hard feeling, and is the more simple and expeditious, as well as much the most economical. The stock of this corporation has of late received eight per cent. dividends, and now sells in the market for about \$136 per share. Under the law of the Commonwealth the dividends are practically limited to ten per cent. per annum. During the last ten years the company has averaged 7.4 per cent. annual dividends, and has never risen above 9 per cent. During the last year it has barely earned its usual dividend, its gross receipts falling off about \$85,000, and its net earnings nearly \$40,000, their estimated amount (\$303,000) being equal to a dividend

of 8.32 per cent.* In view of this decrease apparently the directors of the road have fallen into, what the commissioners cannot but consider, the fatally short-sighted policy of raising the rates of their local freight tariff. This mistake is rather likely to increase than decrease the falling off, and the company can hardly look forward with any confidence to being for an indefinite time to come more than an eight per cent. road. Assuming this as a basis of negotiation, it is difficult to see on what ground the corporation could refuse an offer from the state of guaranteed six per cent. bonds at par in exchange for the stock of the road at a premium of \$50 per share. Every holder of such bonds would, in place of eight per cent. dividends, subject to all sorts of contingencies, and with ten per cent. in remote possibility, annually receive from interest and after exchange nine per cent. guaranteed, or in cash, \$14 per share above the selling market price. Purchased on this estimate, the road would come to the Commonwealth at an average cost per mile of \$50,000, and the commissioners think it safe to say that such a purchase would be one fair and advantageous to both parties. The question is, indeed, not without difficulties, but difficulties of the same nature surrounded the purchase by government of telegraphs in England and of railways in Ireland, and were not found insuperable. Until, however, they could know directly and distinctly what are the wishes and policy of the legislature on the subject, the commissioners have not, of course, felt at liberty to make any overtures to the parties in interest.

Upon the second point, that of state management, the commissioners desire to express their hope that state ownership will not be found to necessarily imply state management. Indeed, in their opinion, the whole result of this important experiment turns on the success with which the question of management can be kept out of politics,—can be held distinct from all party machinery. In this respect many excellent provisions are contained in the bills reported to the last legislature by the commission on cheap transportation. The end in view is to provide a machinery through which the direction of the road shall be confided to trustees, with duties in the nature of those ordinarily pertaining to supervisors of highways. Neither

* As the returns for 1870 include but ten months exact amounts cannot be given. In the above statement the returns of ten months are averaged over the entire year.

state nor the trustees undertake personally to manage the road, but they simply produce a paid manager, who, only, is directly responsible, and who takes charge of the road under the advisory supervision of the state trustees. One improvement in the machinery proposed the commissioners wish decidedly to recommend. Recent scandalous proceedings in other states have illustrated the necessity of introducing some form of minority representation into corporate elections. In the case of the Erie Railway, and in that of the Boston, Hartford & Erie, many of the largest as well as the most respectable of the stockholders of each company are absolutely deprived of all participation in the management of their property, and even of the power to protect it. However the systems of minority representation hitherto suggested may apply in practice to complicated popular elections, no question can exist that they are perfectly adapted to corporate elections, and would furnish a great safeguard against evils now notorious. If the trustees for the proposed road are, therefore, to be elected by the legislature and from the community at large, it would be well to adopt some system which will enable any considerable class in the community to obtain a representation among them in order to introduce into the board that activity of thought and management which results from the mere discussion of theories, which may yet be rejected ; and, finally, this would afford every human precaution against those dangers which in this country so easily beset all public industrial enterprises.

Before bringing this long report to a close, it only remains for the commissioners, in few words, to restate the policy they wish to see initiated. They propose that the two systems of operating railroads, that through a public and that through a private management, should be placed side by side, each under the auspices most favorable to development, and subject to no laws but those of Massachusetts. Both systems will distinctly understand that they are on trial ; the private corporations will have a reasonable time afforded them in which to justify the existing management ; but, if their results through the coming years are less advantageous to the public than those produced through state control, they must be prepared to surrender their trusts into the hands which conferred them. The managers of these corporations cannot complain that the trial is not a fair

one, upon the ground that the state road will be operated regardless of profit while they will be expected to keep up their dividends. The state road must, under public management, pay the interest on its whole purchase cost, being the equivalent of at least nine per cent. dividends on its present outstanding stock. If, in addition to this, it fails to keep in repair its material and to develop its traffic, then the experiment must end in utter failure. The advantages will, in fact, for some years be wholly in favor of the private corporations. Their burdens will be no heavier; their machinery and organization will be the more perfect. Under these circumstances they should, as finally putting to rest an issue which hitherto they have regarded with apprehension, gladly accept the test, rather than shrink from it. Finally, the corporations and a large portion of the public have strenuously maintained that, in this country at least, the railroad system could most advantageously be managed, both for energy and economy,—as regards the railroads and as regards the community,—through private enterprise. This, as they have already intimated, the commissioners are disposed neither to deny or to concede; it is a subject upon which their minds are wholly open to conviction. They simply desire to try the experiment. Even those who oppose the public control of railroads upon economical or political considerations, can scarcely object to the trial of so limited and carefully restricted an experiment as that now proposed, if only that they may see their anticipations practically realized. Such an unreasoning antipathy to change would exceed even the conservatism of the British Parliament, which is now preparing to devote the whole railroad system of Ireland to a fair attempt at the solution of this difficult problem. The commissioners have only further to say, that they believe the course they have marked out combines as many advantages, with as few dangers, as any which is likely to be suggested; certainly, if it should prove otherwise, the failure will not arise from any lack of anxious consideration on their part, or from any want of a due sense of the heavy responsibility under which they have been called upon to advise.

**JAS. C. CONVERSE,
EDWARD APPLETON,
CHAS. F. ADAMS, JR.,**
Commissioners.

APPENDIX.

[A.]

INSPECTION OF RAILROADS.

The commissioners have visited several of the railroads of the state, and generally were well satisfied with what they observed of the condition of the roads and the improvements in progress.

Eastern Railroad.

The road-bed and rails of this road are in very good condition and well cared for throughout. Some steel-headed rails were examined on a part of the road, which had been laid four years; several of them were found to be splitting at the ends, and a comparison of them with iron rails in the opposite track was altogether in favor of the iron. These were among the earliest steel-headed rails manufactured, and probably those made now at the same place would not show the same imperfections. The commissioners note this case as a part of the history of the experiment. At the crossings of the Fitchburg and Maine Railroads, Mansfield frogs have been put in, and give much better satisfaction than the old style of frogs or the cast-steel ones. During the past few years, the equipment of this road has been considerably increased, and is kept in very good condition. Miller's coupling has been applied to some of the cars. A car for drovers' use was specially noted as the most comfortable of the kind we had seen. The engine-shops of this road are at East Boston, and the car-shops at Salem, both well supplied with all varieties of good tools. This road is, however, very deficient in its station buildings; many of them are old and altogether unworthy of the population they should accommodate. Those at Portsmouth, Hampton and North Hampton, and at Danvers and Peabody on the Lawrence branch, are exceptions to the above remark. Even in some of these, however, one defect was noticed which appears to pervade nearly all the stations on the Eastern Railroad; viz., the seats, which seem to be ingeniously contrived for the discomfort of the passengers, and on which

the commissioners think this road must hold a patent, as none like them can be found elsewhere. A narrow ledge of plank is fastened to the side of the room, and a moulding projecting about an inch and a half is put on above, at just the right height to strike the middle of the back. These seats are nowhere surpassed in discomfort, except by those in the second-class cars of the Grand Trunk Railroad. Perhaps this is a small matter for state commissioners to allude to, but while discussing broad questions of general policy, they also think it right not to lose sight of minor matters affecting the comfort of the travelling public.

Boston and Maine.

The road-bed and track of this road were also found in excellent condition, new cars and engines frequently added to the rolling stock, and the equipment generally well kept up, although it must be noted that some of the engines, from the amount of smoke and cinders they continually emit, must be very extravagant consumers of coal. The double track of this road, already extending to North Andover, is now under construction to Bradford. A large amount has been expended in the past few years by this company in improving and rebuilding their stations, and there are a few more places where the old buildings are yet standing but are soon to be replaced by new ones. The Boston station, and those at Haverhill and Exeter, especially deserve commendation. New stations at Malden and Reading are going up. A large amount has also been expended the past year in a new freight yard and station at Dover, planned on a liberal and comprehensive scale. New passenger stations at this place and at South Lawrence will come next in order. The branch to Lake Winnipiseogee is kept up in very good condition, and has some fine station buildings upon it. The Newburyport line of this road was also found in good condition.

Fitchburg Railroad.

The road-bed of this road is kept in good order, with good ties and good joints. The rails however are worn down to a greater extent than is usually allowed on roads doing so large a business. It is not considered economy by the officers of this road to repair old rails by welding, and the commissioners are inclined to think that they are right, so far as the use of such rails in main track is considered, but the economy of getting the greatest possible wear out of the rails before renewing appears to be carried quite as far as prudence and safety will permit. Very large expenditures for new rails will, in the judgment of the commissioners,

be necessary upon this road for the next two years, and if, as stated, at some points their iron rails last only two years, it would appear advisable here to try steel rails. This corporation are now making large expenditures at the Boston terminus for the accommodation of the freight of the upper roads; and at Watertown have provided new cattle-yards and buildings on a generous scale for the accommodation of the cattle business which must be removed from Cambridge. At Walden Pond this corporation has provided grounds with all necessary buildings for the accommodation of picnic parties in the summer, an outlay which we have no doubt proves a source of revenue to the company, and an example which we think it would be well for other companies to imitate. The branch to Marlborough was traversed, and also that to Mason, N. H., where a new bridge, five hundred feet long, has been built the past year. The station buildings on the Fitchburg road are not remarkable for beauty and convenience. That at Groton Junction has been ordered by the commissioners to be rebuilt, and that at Fitchburg ought also immediately to be replaced by a new one better adapted to the wants of the community, but in this case it appears to be the duty of the Clinton line to make the first move. The Clinton line and the Fitchburg road were *authorized* two years ago to build a new union depot at Fitchburg; they ought now to be *required* to do so without further delay. In approaching Fitchburg, there is a grade crossing of the Fitchburg road by the Clinton line, which might be and ought to be obviated by making one road pass over the other.

Cheshire Road.

This road was remarkably well built when first constructed; its masonry is everywhere of the first class. No other road in the state enjoys the distinction of having no bridge over the track less than eighteen feet high above the rails. Some steel rails of Krupp's manufacture were noted, which had been laid two years with no perceptible wear. One of them however was "too high," and several pieces of the top had broken off like cast-iron. The shops of this road are at Keene, and are quite a model for convenient arrangement, neatness, and order. The bridge at Bellows Falls is a very substantial structure. From Keene the commissioners took the Ashuelot road, operated by the Cheshire, to South Vernon; a branch line kept up in fair condition, probably not doing a very large business.

Vermont and Massachusetts.

During the spring the bridge over Deerfield River, carried off by the freshet of October, 1869, was rebuilt, and the branch to Turner's Falls completed. During the year considerable ditching has been done upon this road, thirty thousand new ties and five hundred tons of new rails put into the track, which is materially improved over its condition last year. Another year will probably bring the whole length of the road into very good condition. A serious accident occurred during the year at one of the bridges on this road, but it was not owing to any unsoundness or want of strength in the bridge. Some of the bridge guards on this road were noted as broken off, probably done in a pet by some freight brakeman in consequence of being rapped by them, a thing which has been done upon other roads. It is singular that some people should so seriously object to being warned of danger.

Troy and Greenfield.

This road, which was so much injured by the freshet of October, 1869, as to be unfit for further use, has been under repair during the year, and was opened for use again on the fourth of July. Many culverts which were washed out have been replaced by larger and better ones, new bridges built where others had been carried off, the slopes of the embankments protected against washing, ditches widened, and in all respects the road put in better condition than it was before the freshet.

Boston, Clinton and Fitchburg.

This road was found as last year in good condition, well ditched and track well taken care of. At Leominster a new station has been built; at Framingham the line of the road has been straightened. At Fitchburg, as before remarked, the grade crossing of the Fitchburg road by this road should be removed, and a new union depot built. At Clinton Junction the commissioners saw some wire fence made at the factory there, for railroads in Illinois, to be delivered at Chicago for \$1.12½ per rod. This style of fence is worthy of attention from our own roads; it appears to be cheaper than the common fences, and not liable to destruction by fire.

Mansfield and Framingham.

The commissioners have several times passed over this road during the year, and have noted the improvement at each successive visit. The ballasting is now completed, but some additional work should be done on the masonry. Good judgment has been shown

in selection of depot grounds, and convenient buildings have been erected, especially at Foxborough. At Mansfield a very good engine-house of stone with an excellent turn-table has been completed. The commissioners regret that this road was not located so as to pass over the Hartford and Erie, instead of crossing both its lines at grade. Through the enterprise and activity of the managers, a large freight business already passes over this line, but it has brought into view already some defects in the rails, which are light (50 lbs. per yard) for a heavy business.

Taunton Branch and New Bedford and Taunton.

Although making no special visit to these roads, the commissioners have several times had occasion to pass over them. It would seem that these two corporations, with the Middleborough and Taunton, doing chiefly a connected business, should be consolidated into one. The road-bed and track on these roads are kept in good condition. There is a good passenger building at Taunton, except that it is not long enough for proper accommodation of trains. During this year the Taunton road has been building a branch to Attleborough, not yet completed. On the New Bedford road the way-stations have been improved of late, but the terminal station at New Bedford is a disgrace to the corporation and to the city.

Boston, Hartford and Erie.

An anonymous complaint was sent to this board in regard to a bridge on the Woonsocket division of this road. Such communications do not merit attention, still it was deemed best to examine the bridge, that no accident might be chargeable to any want of care on the part of this board. The bridge was found to be amply strong to sustain the weight of trains passing over it, and the piles and upright timbers likely to last for some years. But the caps and stringers were in some places somewhat decayed, and the superintendent was advised to have them replaced by new ones immediately. The road-bed and track on this division were found in fair condition, and the business of this section appeared to be increasing. The Blackstone division has been kept in good order during the past year; but more new rails are needed on some parts of it. Many of the bridge guards on this division had been broken, and notice thereof was given to the superintendent.

Providence and Worcester.

No road in New England occupies a better position for business than this, passing for its whole length through a busy manufacturing

valley, on easy grades, with stations affording business, almost every second mile. A new and convenient station has been built at Blackstone. The second track has been completed from Providence nearly to Woonsocket, and has also been begun at the other end of the road. Road-bed and track in good order. The commissioners are glad to notice that this company readily supply coal dumps and side tracks at any points on their line when requested. Upon some cars of this road, Olmstead's Electric Brake has been applied, which may be put in action on any car by itself, or on all the cars in the train at once from the engine. The power is furnished by a battery in each car; the electric action keys up a loose wheel on the axle, and this winds up a chain attached to the brake. The advantage of this brake over Creamer's or any other acting by a spring is that it is always ready for action, and does not need to be wound up every time it has been used. In the experiments witnessed by the commissioners, it did not appear to have any superiority in quickness of action over the common hand-brake. The superintendent of the road, however, stated that this brake had been in use on five cars for two months, and had given good satisfaction; that it would stop a train in thirty-three seconds in running not much more than the length of the train. Upon this road also some of the bridge guards had been destroyed, probably from the same reasons alluded to in a former case.

• *Steel Rails.*

During the past year the commissioners have kept in mind this subject, and have made inquiries in regard to it from time to time. The use of steel rails and steel-topped rails is increasing and the results of the continued trial of them strengthen the conclusions given in last year's report. The commissioners have received from Mr. Booth a section from one of his steel-topped rails which had been in use on the New York Central Railroad for twenty months; on down grade going east near Rochester. This rail had borne more than six million tons, and had only been reduced by wear on the top $\frac{1}{32}$ of an inch. The commissioners are informed that several of the New England railroads intend to lay these rails during the ensuing year.

The commissioners have also received from Abram S. Hewitt, Esq., of New York, a letter giving the results of an inspection of the iron and the steel-topped rails made at Trenton, N. J., and laid upon the Erie Railway; and they deem this letter so instructive to all who take an interest in the subject, that they take pleasure in publishing it in this report.

lxxviii RAILROAD COMMISSIONERS' REPORT. [Jan.

NEW YORK, Dec. 15th, 1870.

We have now reached definite conclusions in regard to steel-topped rails. We have made an inspection of every rail laid prior to January 1, 1870, on the Erie Railroad of our make, whether steel-topped or iron. You will bear in mind that the steel used for the heads is puddled, and not cast or homogeneous steel. It is necessarily of low temper, in order to secure a weld with the iron.

It is harder and has more tensile strength than iron, but it is softer and has less tensile strength than cast-steel, even of the low grade (so far as carbon is concerned) used for Bessemer and other steel rails.

A priori, it might be expected that the durability of this material would be intermediate between iron and steel—that is, more durable than iron and less so than steel. It is also intermediate in cost, and the problem to be solved is, whether iron rails, or iron rails with puddled-steel tops, or cast-steel rails are more profitable with a given volume of business.

I think that it is now demonstrated that with a small business, where iron will endure from 12 to 15 years, iron is the more economical material; with a larger business, where iron will endure five years, the puddled-steel tops are the cheapest; and with a larger business, where the average life of an iron rail does not exceed three (3) years, steel rails are the cheapest. Our experience is mainly confined to the Erie Railway, which comes within the third category. In arriving at this conclusion we assume that good iron rails cost \$75 per ton, puddled-steel headed rails \$90 per ton, and cast-steel rails \$105 per ton.

Now for the results on the Erie Railroad, premising that we have made no inspection of the cast-steel rails laid down, and can therefore institute no definite comparison with them, but we are told that the failures during the time covered by our report have been comparatively insignificant, and we believe that the report is true.

The total number of rails delivered, prior to the date when the inspection began was 46,276 rails; of these we found in track 45,716 rails, and 560 rails were not found. Some of these 560 rails may have been overlooked in the track; but in making up the results, we have assumed them to have entirely failed, thus making the worst case for the durability of the rails.

Again, the rails were made by several different methods of piling, some of which have proved to be better than others; and the result would therefore have been more favorable if all the rails had been made by the method which experience has proved to be best.

Of the total number of 46,276 rails, there were puddled-steel tops, 36,238; iron rails, 8,103; doubtful marks, 1,935; by "doubtful marks," is meant, that the inspector could not determine to which class the rails belonged.

The average time of wear in track of these rails is 13 months; and this average time is equal for the steel-topped, and the iron-topped rails; so that the comparison is perfectly fair as to the time, but as a general rule the steel-topped rails were laid in places where the wear is greatest. To that extent the comparison is more favorable to the iron rails than it should be.

The results of the inspection are as follows:—

Steel-Topped Rails.

Good rails in track,	84,867
Imperfect rails in track,	833
Failures, including missing rails,	538
Percentage of failures,	1.5 per cent.
Percentage defective in track,	2.3 "
Total percentage failed and defective,	3.8 "

Iron Rails.

Good rails in track,	6,934
Imperfect rails in track,	593
Failures, including missing rails,	576
Percentage of failures,	7.1 per cent.
Percentage of defective in track,	7.3 "
Total of failed and defective rails,	14.4 "

Doubtful Rails (whether Steel or Iron.)

Good rails in track,	1,738
Imperfect rails in track,	103
Failures, including missing rails,	94
Percentage of failure of rails,	4.9 per cent.
Percentage of defective rails,	5.3 "
Total percentage of failed and defective,	10.2 "

These results go to show that these doubtful rails were mostly iron rails.

For general conclusions, the result may be stated, that on the Erie Railroad where the volume of business is enormous, and from the width of the gauge, the weight of the cars and locomotives is far greater than on narrow gauge roads, and the rate of speed is fully equal to any other American road,

Fourteen four-tenths per cent. of iron rails made in the best possible manner failed in thirteen months' wear, at which rate all the rails will be worn out in ninety months or seven and a half years, making the average life of the rail three and three-quarters years.

Three eight-tenths per cent. of puddled-steel topped rails failed, at which rate all the rails will be worn out in three hundred and forty-two months, equal to twenty-eight and a half years, making the life of the rail fourteen and a quarter years, if we assume that the failures will go on at the same rate and that the rate of failure will be uniform for each kind of rail.

I consider therefore that the results on the Erie Railroad have fully justified the policy of substituting steel-topped rails for iron rails, at an extra cost of ten dollars per ton (in their case), and if *all-steel* rails could be had at an extra cost of ten dollars per ton over the cost of these steel-topped rails, I believe that a still greater economy would result.

This conclusion still leaves open the question whether a cast-steel top may not be advantageously applied to an iron rail, but I do not consider this point of much practical importance, because I believe that all-steel rails can be made as cheaply as iron rails with cast-steel tops, and all difficulty in rework-

ing old steel rails has disappeared with the full success of the Martin process for melting steel scrap on the open hearth of a reverberatory furnace.

The practical result of the renewal of the eastern portions of the Erie Railway with steel-topped rails has been to reduce the requirements for new rails from two thousand tons per month, when Mr. Gould assumed the management of the road, to about six hundred tons per month at the present time. This requirement may however be expected to increase rather than to diminish from this time henceforth ; but being reduced to so small a quantity I have advised Mr. Gould to have the Trenton works prepared for the manufacture of all-steel rails for future renewals, whereby I anticipate that the life of the track will be doubled.

The policy adopted of getting to all-steel, by means of puddled-steel tops, by which the old rails were all made available and the outlay kept within moderate limits is most suggestive for roads doing a large or an increasing business ; and is probably the only practicable method of arriving at the ultimate desideratum of an *all-steel* track, without taxing the resources of the railway corporations beyond their immediate strength to bear.

Faithfully yours,

ABRAM S. HEWITT.

[B.]

CONDENSED STATEMENT OF THE PROGRESS OF NEW RAILROADS.

AMHERST BRANCH RAILROAD—CHARTERED, 1848.

Charter revived, 1864. Organized, November, 1869. Charter amended, &c., chap. 70 of Acts of 1870. No action taken since.

ASBURY GROVE RAILROAD—CHARTERED, 1870.

One mile long; constructed and bought by Eastern Railroad Company.

ATHOL AND ENFIELD RAILROAD—CHARTERED, 1869.

The first instalment, \$25,000, of the capital stock has been paid in this year, and \$18,000 has been expended in engineering and grading. Several towns have voted to take stock. Thirty miles long.

ATTLEBOROUGH BRANCH RAILROAD—CHARTERED, 1870.

Organized, whole amount of capital stock subscribed for, and 60 per cent. assessed and paid in. Road is now nearly or quite completed, and is leased to the Boston and Providence Railroad Company for thirty years, lessees to equip and operate it. Four miles long.

BOSTON, BARRE AND GARDNER RAILROAD—CHARTERED, 1847-9.

During the year, \$61,990 of capital stock has been paid in, making total paid in, \$166,190; \$137,867.93 has been expended for construction, mostly during this year.

DUXBURY AND COHASSET RAILROAD—CHARTERED, 1867.

During the year the whole amount of capital stock (\$350,000) has been subscribed, 20 per cent. paid, and 30 per cent. payable January 1, 1871. Careful surveys of the route have been made, and construction will be commenced soon.

lxxxii RAILROAD COMMISSIONERS' REPORT. [Jan.

FRAMINGHAM AND LOWELL RAILROAD—CHARTERED, 1870.

Company organized and a portion of stock subscribed for, but nothing further accomplished.

GRAFTON AND MILLBURY RAILROAD—CHARTERED, 1870.

Company organized and a part of stock subscribed for, but no steps have been taken towards construction.

LANCASTER RAILROAD—CHARTERED, 1870.

Company organized in August, and "sufficient stock was subscribed for the organization." An engineer was appointed, and he is now engaged upon the surveys.

MANSFIELD AND FRAMINGHAM RAILROAD—CHARTERED, 1867.

This road was completed and opened in June, 1870. Length, 22.11 miles. Cost of road and equipment, \$638,185.32. Leased to and operated by the Boston, Clinton and Fitchburg Railroad Company.

MASSACHUSETTS CENTRAL RAILROAD—CHARTERED, 1869.

A large part of the stock required before commencing work has been subscribed for, much of it by the towns authorized so to do. No capital stock has been paid in, and a floating debt of \$5,900 has been incurred, chiefly for surveys which have been in progress. Construction of eastern section contracted for.

NEW BEDFORD AND MIDDLEBOROUGH RAILROAD—CHARTERED, 1870.

Company not organized.

SALISBURY RAILROAD—CHARTERED, 1869.

United under provisions of charter with a New Hampshire corporation, under name of Exeter and Salisbury Railroad. Sufficient stock has since been subscribed for by towns and individuals to authorize the building of the road. The subscriptions are on the condition that the road can be leased to some responsible railroad company. The directors have not yet succeeded in effecting a lease, and "everything is dependent on that."

SHAWMUT RAILROAD—CHARTERED, 1870.

Company organized and some preliminary surveys made. Stock not subscribed for. "Further steps, it is expected, will soon be taken."

STOCKBRIDGE AND PALMER RAILROAD—CHARTERED, 1870.

Company organized. Brimfield and Sturbridge have voted to take stock to the amount of \$82,400, conditional on the raising of \$400,000. No subscriptions have yet been made. Efforts will be made this winter to secure subscriptions to stock.

MONADNOCK RAILROAD—CHARTERED, 1869.

Capital of road in this state, \$50,000, all of which has been paid in this year, and the road is in process of construction, \$19,820 having been paid for graduation and masonry and \$14,500 for superstructure during the year. The road is completed to Jaffrey, N. H. A little over two miles of it is in Massachusetts.

WEYMOUTH BRANCH FREIGHT—CHARTERED, 1870.

No information received relative to this road.

[C.]

Commonwealth of Massachusetts.

In the Year One Thousand Eight Hundred and Seventy-One.

A N A C T

TO AUTHORIZE THE FORMATION OF RAILROAD CORPORATIONS.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows :

SECTION 1. Any number of persons, not less than ten, may form a company for the purpose of constructing, maintaining and operating a railroad for public use in the conveyance of persons and property within this Commonwealth; and for that purpose may make and sign articles of association, in which shall be stated the name of the company, the places from and to which the road is to be constructed, maintained and operated; the length of such road, as near as may be, and the name of each town and county in this state through or into which it is intended to be made; the amount of the capital stock of the company, which shall not be less than twenty thousand dollars for every mile of road proposed to be constructed, and the number of shares of which said capital stock shall consist; and the names and places of residence of at least five persons who shall act as directors of the proposed company and shall manage its affairs until others are chosen in their places. Each subscriber to such articles of association shall subscribe thereto his name, place of residence, and the number of shares of stock he agrees to take in said company.

[Laws of New York, Acts [1850, ch. 140, § 1; 3 Statutes at Large, 617; Laws of Ohio, Act of May 1st, 1852; 1 Revised Statutes, p. 271; Statutes of Indiana, Gavin & Hord, Vol. 1, p. 504; Statutes of Illinois, Gross, Ed. 1869, p. 541, § 39; Compiled Laws of Michigan, Cooley's Ed., 1857, p. 681, § 1; General Statutes of Kansas, 1868, ch. 23, art. 2, § 5.]

SECTION 2. Said articles of association shall not be filed and recorded in the manner provided in section three of this act, until at least twenty thousand dollars of stock for every mile of railroad proposed to be constructed is subscribed thereto, and ten per cent. paid thereon in good faith, and in cash, to the directors named in said articles of association; nor until there is indorsed thereon, or annexed thereto, an affidavit made by at least five of the directors named in said articles, that the amount of stock required by this section has been in good faith subscribed, and ten per cent. paid thereon in cash as aforesaid, and that it is intended in good faith to construct, maintain and operate the road mentioned in such articles of association, which affidavit shall be recorded with the articles of association, as aforesaid. The provisions of section seven of chapter sixty-three of the General Statutes shall not apply to corporations organized under this act.

[Laws of New York, Acts 1850, ch. 140, § 2; Statutes of Illinois, Gross, Ed. 1869, p. 542 [40]; Statutes of Michigan, Cooley's Ed., 1857, Vol 1, pp. 631-2.]

SECTION 3. Whenever it shall be shown to the satisfaction of the board of railroad commissioners that all the provisions of sections one and two of this act have been complied with, the clerk of said board shall indorse upon the articles of association a certificate of such fact and the approval of the board in writing. The secretary of the Commonwealth shall, upon the same being deposited in his office, and upon the payment of the sum of fifty dollars (\$50), cause the same, with the indorsement thereon, to be recorded, and shall issue a certificate in the following form:—

COMMONWEALTH OF MASSACHUSETTS.

Be it known that whereas [here the names of the subscribers to the articles of association to be inserted] have associated themselves with the intention of forming a corporation under the name of [here the name of the corporation shall be inserted] for the purpose of building and operating a railroad between [here insert the description of the road contained in the articles of association] and have complied with the statutes of this Commonwealth in such cases made and provided. Now, therefore, I, [here the name of the secretary to be inserted] secretary of the Commonwealth of Massachusetts, do hereby certify that said [names of subscribers] their associates and successors, are legally organized and established as an existing corporation, under the name of [name of corporation] with the powers, rights and privileges, and subject to the limitations, duties and restrictions which by law appertain thereto. Witness my official signature hereunto subscribed, and the seal of the Commonwealth of Massachusetts hereunto affixed this day of in the year of our Lord . [Day, month and year inserted.]

The secretary of the Commonwealth shall sign the same and cause the seal of the Commonwealth to be thereto affixed, and such certificate shall be conclusive evidence of the organization and establishment of such corporation at the date of such certificate. The secretary shall also cause a record of such certificate to be made, and a copy of such record duly certified may with like effect as the original certificate be given in evidence to prove the existence of such corporation.

[Acts 1870, (Mass.) ch. 224, § 11; Laws of New York, Acts 1850, ch. 140, § 8; Statutes of Illinois, Gross, Ed. 1869, p. 542, [41;] Statutes of Indiana, Gavin & Hord, Vol. 1, p. 504; Statutes of Michigan, Cooley's Ed., 1857, Vol. 1, p. 632, § 2.]

SECTION 4. The first meeting for the purpose of organizing such corporation shall be called by a notice signed by five or more of the subscribers to such articles of association, stating the time, place and purpose of such meeting, a copy of which notice shall, seven days at least before the day appointed for the meeting, be given to each subscriber, or left at his usual place of business or place of residence, or deposited in the post-office, post-paid, and addressed to him at his usual place of business or place of residence. And whoever gives such notices shall make affidavit of his doings, which shall be recorded in the records of the company.

[Acts 1870, (Mass.) ch. 224, § 9.]

SECTION 5. In case the capital stock of any company formed under this act is found to be insufficient for constructing and operating its road, such company may increase its capital stock from time to time to any amount required for the purposes aforesaid, not to exceed in all forty thousand dollars for each mile of road actually constructed. Such increase must be sanctioned by a vote in person or by proxy of two-thirds in amount of all the stockholders of the company, at a meeting of said stockholders called by the directors of the company for that purpose.

[Laws of New York, Acts 1850, ch. 120, § 9; Statutes of Indiana, p. 520, ch. 181.]

SECTION 6. Every corporation organized under this act, before commencing the construction of its road, shall present to the board of railroad commissioners a petition for approval of location, accompanied with a map of the proposed route on an appropriate scale, and with a profile of the line on a vertical scale of ten to one compared with the horizontal scale, and with a report and estimate prepared by a skilful engineer from actual survey. The board of

railroad commissioners shall, on presentation of such petition, appoint a day for a hearing thereon, and the petitioners shall give such notice thereof as said board shall deem reasonable and proper, in order that all persons interested may have an opportunity to appear and object thereto. If the board of railroad commissioners, after hearing the petition, shall approve the proposed location, the corporation may proceed with the construction of their road: *provided*, that they shall first file with the county commissioners of each county through which the road passes, a plan of the location of the road, defining its courses, distances and boundaries, and another copy of the same with the board of railroad commissioners; but the location so filed shall not vary from the route first presented to said board of commissioners, unless said variation shall be approved by them. And said location shall be filed within two years from the time when the articles of association are filed in the office of the secretary of state. The provisions of sections thirteen, fourteen, fifteen, sixteen and eighteen of chapter sixty-three of the General Statutes shall not apply to corporations organized under this act.

[Laws of New York, Acts 1850, ch. 140, §§ 22-8; General Statutes of Connecticut, 1866, p. 187, § 474; p. 194, § 504.]

SECTION 7. If any corporation formed under this act shall not, within three years after its articles of association are filed and recorded in the office of the secretary of state, begin the construction of its road, and expend thereon ten per cent. of the amount of its capital, or shall not finish the road and put it in operation in five years from the time of filing its articles of association as aforesaid, its corporate existence and power shall cease.

[Laws of New York, Acts 1850, ch. 140, § 47; Statutes of Indiana, Gavin & Hord, p. 517, § 84; Purden's Digest, (Penn.) p. 841, § 21.]

SECTION 8. Every corporation organized under this act shall, within one year after any part of their road has been constructed and opened for operation, cause to be made a map and profile thereof and of the land taken or obtained for the use thereof, and file the same in the office of the secretary of the Commonwealth; and also like maps of the parts thereof located in different counties, and file the same in the offices for recording deeds in the county in which such parts of roads shall be. Every such map shall be drawn on a scale and on paper to be designated by the board of railroad commissioners, and certified and signed by the president and engineer of such corporation.

[Laws of New York, Acts 1850, ch. 140, § 45; Statutes of Indiana, Gavin & Hord, p. 517, § 88.]

lxxxviii RAILROAD COMMISSIONERS' REPORT. [Jan.

SECTION 9. No railroad constructed under the provisions of this act shall be opened for use until it has been inspected and approved as in suitable condition for operation by the board of railroad commissioners.

[General Statutes of Connecticut, 1866, p. 194, § 505.]

SECTION 10. Any corporation having actually constructed and put in operation a railroad under the provisions of this act may be consolidated with any existing railroad corporation of this Commonwealth or of any adjoining state, with whose railroad such new railroad connects or intersects: and that such consolidation shall be ratified by a majority of two-thirds of the stock of each of said corporations at meetings duly called for the purpose, after one year's notice of such meetings duly given through the public prints, in such manner as the board of railroad commissioners shall direct, and that such consolidation is not disapproved by the legislature before such meetings are held; and *provided, also*, that the entire stock and indebtedness of such consolidated company shall not exceed the united stock and indebtedness of the companies prior to such consolidation.

[Laws of New York, Acts of 1869, ch. 917; Statutes of Illinois, Gross, Ed. 1869, p. 537, III.; Statutes of Indiana, Gavin & Hord, p. 526, ch. 137; Statutes of Michigan, Cooley's Ed., 1857, Vol. 1, p. 653, ch. 67; Revised Statutes of Wisconsin, 1858, ch. 79, §§ 1-2; Purden's Digest, (Penn.) p. 841, §§ 24-5.]

SECTION 11. Two corporations created by this state, or by the acts of this and an adjoining state, whose roads enter upon or connect with each other, may contract that either corporation shall perform all the transportation of persons and freight upon and over the road of the other: *provided*, that one year's notice of the intention to make such contract shall be given in writing by such corporations to the board of railroad commissioners, and that such contract is not disapproved by the legislature before the expiration of such year of notice; and *provided, also*, that the income arising from such contracts shall be subject to the provisions of law in regard to the right of the state to purchase the roads or reduce their tolls, in the same manner as that arising from the use of the roads. Section one hundred and fifteen of chapter sixty-three of the General Statutes and chapter two hundred and ninety-eight of the acts of eighteen hundred and sixty-seven are hereby repealed.

[General Statutes, (Mass.) chap. 63, § 115; Acts 1867, chap. 198.]

Tabular Statement of Municipal Aid to Railroads, authorized by Acts of the Legislature, the Amount Voted by Towns,¹ and the Vote Required.

RAILROAD AND ACT.	City or Town.	Amount authorized.	Amount voted.	Vote required.
Cape Cod Branch,— 1852, chap. 156,	Nantucket, .	\$50,000 00	\$50,000 00	Two-thirds, ballot.
Troy and Greenfield,— 1855, chap. 394,	Ashfield, . Buckland, ² . Conway, . Coleraine, . Charlemont, . Deerfield, . Greenfield, ² . Hawley, . Heath, . Monroe, . Rowe, . Shelburne, . Adams, . Florida, . Williamstown, .	3 per cent. on valuation,	- 3 per cent. of val., - - - Nothing, . - \$30,000 00 - Refused, . - - \$6,000 00 60,000 00 - 32,000 00	Two-thirds. Two-thirds.

¹ So far as information has been received at the office of the Commissioners.

² Subscribed \$5,000.

³ Paid \$22,500.

Tabular Statement of Municipal Aid to Railroads, &c.—Continued.

RAILROAD AND ACT.	City or Town.	Amount authorized.	Amount voted.	Vote required.
Rockport,— 1855, chap. 395, 1860, chap. 34, 1862, chap. 78,	Rockport, ¹ . . . " . . . " . . .	\$20,000 00 50,000 00 25,000 00	No action, . \$50,000 00 25,000 00	Two-thirds.
Milford and Woonsocket,— 1861, chap. 98,	Milford, . . .	\$50,000 00	\$50,000 00	Two-thirds.
Northampton and Shelburne Falls,— 1862, chap. 56,	Williamsburg, . . .	2 per cent. on val., .	No action, . . .	Majority.
Cape Cod Central,— 1863, chap. 96, 1863, chap. 104, 1863, chap. 105, 1864, chap. 11,	Chatham, . . . Harwich, . . . Orleans, . . . Brewster, . . .	\$50,000 00 40,000 00 25,000 00 25,000 00	\$50,000 00 ² 40,000 00 ² 25,000 00 ⁴ 25,000 00 ⁴	Majority.
Pittsfield and New Haven,— 1864, chap. 242, 1864, chap. 245, 1864, chap. 246, 1864, chap. 249, 1864, chap. 260,	Sandisfield, . . . Becket, . . . Otis, . . . Lee, . . . Tolland, . . .	\$50,000 00 40,000 00 50,000 00 100,000 00 25,000 00	Refused, . . . Refused, . . . \$25,000 00 75,000 00 10,000 00	Three-fourths, ballot.
Chebacco Branch,— 1866, chap. 58,	Essex, . . .	\$50,000 00	No action, . . .	Two-thirds.

New Haven and Northampton,— 1866, chap. 66,	Williamsburg,	2 per cent. on val.,	\$28,000 00	Majority.
New Bedford and Taunton, Extension,— 1866, chap. 154,	Fairhaven,	Am't of land damages,	No action,	Two-thirds.
Duxbury and Cohasset,— 1867, chap. 65,	Duxbury,	\$75,000 00	—	} Two-thirds.
	Marshfield,	75,000 00	\$75,000 00	
	Scituate,	75,000 00	—	
Marblehead and Lynn,— 1867, chap. 111,	Marblehead,	\$50,000 00 ¹	\$50,000 00 ²	Two-thirds.
Hopkinton and Milford,— 1867, chap. 225,	Hopkinton,	\$40,000 00	No action,	Two-thirds.
Williamstown and Hancock,— 1867, chap. 238,	Hancock,	\$10,000 00	No action,	Two-thirds.
Gloucester and Lanesville,— 1867, chap 287,	Gloucester,	\$50,000 00	No action,	Two-thirds.
Plymouth and Vineyard Sound,— 1868, chap. 122,	Plymouth,	} 5 per cent. of val.,	No action,	} Majority.
	Falmouth,		No action,	
	Sandwich,		No action,	
	Edgartown,		No action,	
	Chilmark,		No action,	
	Tisbury,		—	

¹ Sold its interest to Eastern Railroad Company for \$75,000. ² Conditions not fulfilled. ³ Subsequently refused.
⁴ Hold, each, 125 shares of Cape Cod Railroad. ⁵ Stock or credit. ⁶ Conditionally; conditions not fulfilled and nothing paid.

Tabular Statement of Municipal Aid to Railroads, &c.—Continued.

RAILROAD AND ACT.	City or Town.	Amount authorized.	Amount voted.	Vote required.
Sheffield,— 1868, chap. 203,	Sheffield,	5 per cent. of val.,	—	Two-thirds.
Ware River,— 1868, chap. 224,	Ware,	5 per cent. of val.,	\$70,000 00	Majority.
Williamsburg and North Adams,— 1868, chap. 225,	Adams, Savoy, Cheshire, Windsor, Cummington, Goshen, Williamsburg, Northampton, Chesterfield, Worthington, Westhampton, Plainfield,	5 per cent. of valuation,	No action, — No action, No action, No action, — No action, No action, No action, No action, No action, No action,	Majority.
Cape Cod,— 1868, chap. 259,	Eastham, Wellfleet, Truro, Provincetown,	5 per cent. of val.,	\$9,450 00 31,800 00 No action, No action,	Majority.

Northampton and Shelburne Falls,— 1868, chap. 305,	Duxbury, Marshfield, Scituate,	\$75,000 00 75,000 00 75,000 00	\$75,000 00 — \$75,000 00	Majority.
Springfield and Farmington Valley,— 1869, chap. 69,	Springfield,	1½ per cent. of val.,	\$308,700 00	Majority.
Springfield and Longmeadow,— 1869, chap. 70,	Springfield,	1½ per cent. of val.,	\$308,700 00	Majority.
Athol and Enfield,— 1869, chap. 174,	Athol, New Salem, Petersham, Dana, Prescott, Greenwich, Enfield, Belchertown, Palmer,	5 per cent. of valuation,	\$90,600 00 16,600 00 22,800 00 13,400 00 10,800 00 — 29,900 00 No action, —	Majority.
Amesbury,— 1869, chap. 175,	Amesbury,	2 per cent. of val.,	Refused,	Majority.
Lebanon Springs,— 1869, chap. 242,	Adams, Williamstown, Hancock,	5 per cent. of val.,	— — No action,	Majority.

1 Marshfield voted under Act of 1867.

Also to guaranty bonds to amount of $\frac{1}{4}$ per cent. of valuation.

Tabular Statement of Municipal Aid to Railroads, &c.—Continued.

RAILROAD AND ACT.	City or Town.	Amount authorized.	Amount voted.	Vote required.
Essex Branch, ¹ — 1869, chap. 183,	Essex,	\$50,000 00	\$50,000 00	Majority.
Lee and New Haven,— 1869, chap. 243, 1870, chap. 899,	Stockbridge, Pittsfield,	\$30,000 00 100,000 00	No action, . . No action, . .	Majority. Two-thirds, ballot and check list.
Massachusetts Central,— 1869, chap. 260,	Hatfield, Hadley, South Hadley, Amherst, Granby, ² Ludlow, Belchertown, Enfield, Greenwich, Ware, Palmer, West Brookfield, New Braintree, Hardwick,	5 per cent. of valuation, .	No action, . . \$300,000 00 No action, . . No action, . . No action, . . \$70,000 00 No action, . . No action, . . \$28,700 00 — No action, . . No action, . . \$15,000 00 — — No action, . . Refused, . . No action, . .	Majority. Majority. Majority.

Massachusetts Central—Con.

Massachusetts Central—Con.		5 per cent. of valuation.		Majority.	
Dana,	—	—	—	—	—
Peterham,	—	—	—	—	—
Barre,	\$90,000 00	No action,	\$90,000 00	Refused,	\$90,000 00
Phillipston,	—	—	—	—	—
Oakham,	—	—	—	—	—
Hubbardston,	—	—	—	—	—
Rutland,	\$25,000 00	—	—	—	—
Princeton,	—	—	—	—	—
Holden,	—	—	—	—	—
Sterling,	—	—	—	—	—
Boylston,	—	—	—	—	—
West Boylston,	—	—	—	—	—
Clinton,	—	—	—	—	—
Lancaster,	—	—	—	—	—
Northborough,	—	—	—	—	—
Berlin,	—	—	—	—	—
Bolton,	—	—	—	—	—
Hudson,	—	—	—	—	—
Stow,	—	—	—	—	—
Marlborough,	—	—	—	—	—
Sudbury,	—	—	—	—	—
Wayland, ⁴	—	—	—	—	—
Weston,	—	—	—	—	—
Winchendon,	—	5 per cent. of val.,	—	Refused,	\$30,000 00*
Amesbury,	—	2 per cent. of val.,	—	Refused,	—

Monadnock,¹—
1869, chap. 284,

West Amesbury Branch,—
1869, chap. 319,

¹ See Act of 1870. ² One majority in a little more than forty votes.
³ Any railroad chartered in 1869 that may pass through Winchendon.
⁴ Unanimously. ⁵ One hundred and three to two.
⁶ Less than two per cent. of valuation.

Tabular Statement of Municipal Aid to Railroads, &c.—Continued.

RAILROAD AND ACT.	City or Town.	Amount authorized.	Amount voted.	Vote required.
Hopkinton Branch,— 1869, chap. 321,	Hopkinton, . .	\$60,000 00	No action, . .	Majority.
Boston, Barre and Gardner,— 1869, chap. 361,	Worcester, . .	1 per cent. of val., .	\$262,200 00	} Majority.
	Holden, . .	5 per cent. of val., .	30,000 00 ¹	
	Princeton, ² . .	} Not more than 5 per cent. to be subscribed in all to any rail- roads,	Refused, . .	
	Rutland, . .		—	
	Barre, . .		—	
	Hubbardston, Gardner, . .		\$37,600 00 38,500 00	
Wrentham Branch,— 1869, chap. 363,	Wrentham, . .	5 per cent. of val., .	No action, . .	—
Holyoke and Westfield,— 1869, chap. 379,	Holyoke, . .	3 per cent. of val., .	No action, . .	—
Essex and Salisbury,— 1869, chap. 392,	Newburyport, ³ .	1 per cent. of val., .	\$70,000 00	Majority.
Newburyport City (Street Railroad),— 1869, chap. 398,	Newburyport, ³ .	1 per ct. of val., ⁴ .	\$70,000 00	Majority.
West Amesbury Branch,— 1869, chap. 401,	Groveland, . . West Newbury, .	} 5 per cent. of val., . {	No action, . . \$50,000 00	} Majority.

Canton and Hyde Park,— 1869, chap. 408,	Canton,	5 per cent. of val.,	No action,	Majority.
North Attleborough Branch,— 1869, chap. 414,	Attleborough,	5 per cent. of val.,	No action,	Majority.
Ware River,— 1870, chap. 78,	Hardwick,	5 per cent. of val.,	\$30,000 00	Two-thirds. list. } Check
	New Braintree,		-	
	Barre,		-	
	Hubbardston,		-	
	Templeton,		\$50,000 00	
	Winchendon,	5 per cent. of val.,	50,700 00 ⁵	Two-thirds. list. } Check
1870, chap. 255,	Phillipston,		Refused,	
Northampton and Amherst, (Amh't Br.)— 1870, chap. 70,	Amherst,	5 per cent. of val.,	-	Two-thirds. list. } Check
	Hadley,		-	
	Hatfield,		-	
	Northampton,		-	
Grafton and Millbury,— 1870, chap. 269,	Grafton,	5 per cent. of val.,	-	Two-thirds. list. } Check
	Millbury,		-	
Exeter and Salisbury,— 1870, chap. 289,	Salisbury,	5 per cent. of val.,	\$20,000 00	Two-thirds. list. } Check
Framingham and Lowell,— 1870, chap. 241,	5 per cent. of val.,	-	Two-thirds. list. } Check

¹ \$14,800 additional, voted conditionally. ² Tie vote. ³ Unanimous vote of City Council. ⁴ Stock or credit. ⁵ Three per cent. of valuation.

⁶ The several towns in which the road may be located. No returns have been received from any town.

Tabular Statement of Municipal Aid to Railroads, &c.—Concluded.

RAILROAD AND ACT.	City or Town.	Amount authorized.	Amount voted.	Vote required.
Hopkinton,— 1870, chap. 299,	Hopkinton, . Milford, . Ashland, .	5 per cent. of val., .	5 per cent. of val., 70, — —	Two-thirds. list. } Check
New Bedford and Middleborough,— 1870, chap. 398,	Lakeville, . Middleborough, Acushnet, . Fairhaven, .	5 per cent. of val., .	Refused, . — — —	Two-thirds. list. } Check
Essex Branch, from Eastern Railroad,— 1870, chap. 129,	Essex, ¹ .	\$50,000 00	\$50,000 00	Two-thirds. list. } Check
Southbridge and Palmer,— 1870, chap. 405,	Southbridge, Sturbridge, . Brimfield, . Holland, . Wales, . Palmer, .	5 per cent. of val., .	— \$48,600 00 33,800 00 7,200 00 — —	Two-thirds. list. } Check

¹ Appropriated \$50,000 towards building the road.

[E .]

Commonwealth of Massachusetts.

RAILROAD COMMISSIONERS' OFFICE, No. 7 PEMBERTON SQUARE, }
Boston, September 24, 1870. }

To the President, Treasurer, Superintendent, and Engineer of the.....

GENTLEMEN :—Herewith we enclose a copy of the new form of return prepared by this board, for the year ending September 30th, 1871. We send it at this time, as required by law, in order to give you the year's notice, so that books may be kept in accordance therewith. The board desire to have the returns in such a shape that a clear and intelligible view of the railroads of Massachusetts, and their business, particularly in this state, may be presented. They will be obliged to you for any suggestions tending to improve the form of the return, either by additions or omissions, and will give such suggestions careful consideration before preparing the form for the following year.

In regard to this return, it will be noticed that "the total amount of income which has been expended in construction, equipment, and purchase of property," is asked for. This will require, of course, research into the past records of the company, but the year will afford ample time to do it, and the board expect that a full return will be made under this head, which, when once done, will not again require time, but will only be added to when necessary. It is, of course, known to the community, that many roads have for years made no dividends to their stockholders, but the public probably have little idea how great an amount of income has been spent for their increased accommodation, instead of being distributed among the stockholders. When income has been appropriated to completing original construction and equipment, or paying off debts incurred for that purpose, whether floating or funded, to building branches or second track, or to purchase of property, it should be returned under this head. Amounts charged off for depreciation

should not be included, nor interest paid on debts; but amounts paid to sinking funds to redeem debts are to be included.

Under the head of "Cost of road, equipment, and property," a slightly different classification of some items has been made, which, in some cases, will require estimates of value to be made by the officers best acquainted therewith. Some roads have been in the habit of entirely neglecting the distribution of items of cost; but this practice must be corrected for the future, and, if the statement cannot be obtained from the books, competent persons must be employed to make the distribution.

Under the head of "Description of road," the intention is to get an intelligible statement of the actual facts of how many miles of railroad there are in Massachusetts, and how many miles have been operated to furnish the income and require the expenses reported. The former returns have been anything but clear in this respect.

The statements as to "Rolling Stock," "Miles run," &c., are intended to be fuller than before, and a new head is introduced, "Classification of business," which it is expected will furnish very valuable information. Perhaps you can give us valuable suggestions in regard to this subject.

In regard to charging any part of the money paid out during the year to capital account, it seems to the board there may often be times when this is a proper course. It should be for such objects as are mentioned, and only for these under extraordinary circumstances. The gradual increase of business requires, of course, a gradual increase of equipment, buildings, and sidings, to correspond with it, which should be met from the annual income. Whatever is done more than this and charged to capital, the board desire a clear statement in regard to it.

The classification of operating expenses has been somewhat changed from the old returns, and, it is believed, improved. Any suggestions in regard to this head will be received with pleasure. The board are perfectly aware that on a well-managed road, the items of expense are distributed much more minutely, but it is not deemed best to call for all these items in a report to the state.

If you are in doubt as to the meaning of any of the queries, or how to answer them, please communicate with the board. On or before the 15th of September next, another copy of the return will be sent.

FORM OF REPORT OF RAILROAD CORPORATIONS,

PREScribed BY THE BOARD OF RAILROAD COMMISSIONERS, UNDER THE
PROVISIONS OF CHAPTER 807 OF THE ACTS OF THE YEAR 1870.

To be returned to the Board on or before the first Wednesday of November, annually.

Report of the.....Railroad Company,

FOR THE YEAR ENDING SEPTEMBER 30TH, 1871.

CAPITAL STOCK AND DEBTS.										\$
Capital stock authorized by charter,	.	.	.	.	.	.	.	.	.	.
Capital stock authorized by votes of company,	.	.	.	.	.	.	.	.	.	.
Capital stock paid in,	.	.	.	.	.	.	.	.	.	.
Capital stock paid in, per mile of road owned by company,	.	.	.	.	.	.	.	.	.	.
Capital stock paid in, proportion for Massachusetts,*	.	.	.	.	.	.	.	.	.	.
Funded debt as follows:—										
1st mortgage bonds, due	,	rate of interest,	.	.	.	.	.	.	.	.
2d mortgage bonds, due	,	rate of interest,	.	.	.	.	.	.	.	.
3d mortgage bonds, due	,	rate of interest,	.	.	.	.	.	.	.	.
Total amount of funded debt,	.	.	.	.	.	.	.	.	.	.
Unfunded debt, incurred for construction, equipment or purchase of property,†	.	.	.	.	.	.	.	.	.	.
Total amount of debt,	.	.	.	.	.	.	.	.	.	.
Proportion of debt for Massachusetts,*	.	.	.	.	.	.	.	.	.	.
Proportion of debt per mile of road,	.	.	.	.	.	.	.	.	.	.
Total amount of income which has been expended (in addition to funds derived from capital and debts) in construction, equipment and purchase of property,‡	.	.	.	.	.	.	.	.	.	.
Total means applied to construction, equipment and purchase of property,	.	.	.	.	.	.	.	.	.	.
Proportion of above for Massachusetts,*	.	.	.	.	.	.	.	.	.	.
Number of stockholders,	.	.	.	.	.	.	.	.	.	.
Amount of stock held in Massachusetts,	.	.	.	.	.	.	.	.	.	.
Number of stockholders in Massachusetts,	.	.	.	.	.	.	.	.	.	.
COST OF ROAD, EQUIPMENT AND PROPERTY.										
Construction of Road and Branches built by Company.										
Grading and Masonry,	.	.	.	.	.	.	.	.	.	.
Bridging,	.	.	.	.	.	.	.	.	.	.
Superstructure, including rails,	.	.	.	.	.	.	.	.	.	.
Land, land damages and fences,	.	.	.	.	.	.	.	.	.	.
Passenger and freight stations, wood-sheds and water stations,	.	.	.	.	.	.	.	.	.	.
Engine-houses, car-sheds and turn-tables,	.	.	.	.	.	.	.	.	.	.
Interest paid during construction, discount, &c.,	.	.	.	.	.	.	.	.	.	.
Engineering, agencies, salaries and other expenses during construction,	.	.	.	.	.	.	.	.	.	.

* Unless some very good reason exists to the contrary, this proportion should be for the miles of road in this State compared with the whole. If you think the proportion should be made on a different basis, please state the reasons therefor.

† This item is not to include balances due other roads, unclaimed dividends, or anything connected with the ordinary operations of the road. It refers only to debts incurred for permanent investments.

‡ In some former reports, certain sums taken from income have been charged off for depreciation. These sums are not now to be reckoned and included under the head of "income expended in construction," &c. Depreciation should properly be charged to maintenance, not as an addition to the permanent investment.

Total expended for construction,	1,000,000	1,000,000	1,000,000
Average cost of construction per mile of road built by company,	100,000	100,000	100,000
Same per mile of single track built by company, not including sidings,	100,000	100,000	100,000
Proportion of cost of construction for Massachusetts,*	100,000	100,000	100,000

Equipment.

Locomotives and snow-plows,	.	.	.	.	.
Passenger, mail and baggage-cars,	.	.	.	.	.
Freight and other cars,	.	.	.	.	.
Machine-shops, machinery and tools,	.	.	.	.	.
Total for equipment,	.	.	.	.	.
Average cost of equipment per mile of road operated by company,	.	.	.	.	.
Proportion for Massachusetts.*	.	.	.	.	.

Property Purchased.

Property Purchased.			
branch, original cost	, purchased for	.	.
Stock of road, shares, purchased for	.	.	.
Bonds of road, nominal amount	, purchased for	.	.
Steamboat	, nominal amount	, purchased for	.
Lands in	, not necessary for operation of road,	.	.
Total of additional property purchased,	.	.	.
Property in Massachusetts,	.	.	.
Whole amount of permanent investments,	.	.	.
Proportion for Massachusetts,	.	.	.
Amount of sinking funds on hand to meet debts,	.	.	.

DESCRIPTION OF ROAD.†

Length of main line of road, from	to	.	.	.	.
Length of main line of road in Massachusetts,		.	.	.	.
Length of main line of road [in other States, specifying each,]		.	.	.	.
Length of line with track laid, if road is not completed,		.	.	.	.
Length of double track on main line,		.	.	.	.
[Branches owned by company. Name and description of each, single or double track,]		.	.	.	.
Total length of branches owned by company,		.	.	.	.
Total length of branches owned by company in Massachusetts,		.	.	.	.
	[in other States, specifying each]	.	.	.	.
Aggregate length of sidings and other tracks not above enumerated,		.	.	.	.
Same for Massachusetts,		.	.	.	.
Total length of tracks belonging to this company,		.	.	.	.
Same for Massachusetts,		.	.	.	.

Roads belonging to other Companies, operated by this Company under Lease or Contract.

[Name, description and length of each,	.	.	.	.	.
Total length of above roads,	.	.	.	.	.
Total length of above roads in Massachusetts,	.	.	.	.	.
	[In other States, specifying each,]	.	.	.	.
Total miles of road operated by this company,	.	.	.	.	.
Total miles of road operated by this company in Massachusetts,	.	.	.	.	.
Number of stations on all roads operated by this company,	.	.	.	.	.
Same for Massachusetts.	.	.	.	.	.

Rolling Stock.

Locomotive Stock.		No. operated
Locomotives (average weight of engines in working order)	.
Tenders (average weight of tenders full of fuel and water)	.
Snow-plows (average weight)	.
Passenger cars (average weight)	.
Mail and baggage cars (average weight)	.
8-wheel box freight cars (average weight)	.
4-wheel box freight cars (average weight)	.
8-wheel platform cars (average weight)	.
4-wheel platform cars (average weight)	.
Other cars,	.	.

Miles run, Rate of speed, &c.

Miles run, rate of speed, &c.			
Miles run by passenger trains,	.	.	.
Rate of speed of express passenger trains, including stops,	.	.	.
Rate of speed of accommodation trains, including stops,	.	.	.
Miles run by freight trains,	.	.	.
Rate of speed of freight trains, including stops,	.	.	.
Miles run by other trains, and for what purposes,	.	.	.
Total train miles run,	.	.	.
Number of passengers carried,	.	.	.
Total passenger mileage, or passengers carried one mile,	.	.	.

* See note on preceding page in regard to proportion.

† Lengths in the statement to be given in miles and decimals. Characteristics of road will be required in a separate report, and when once made need not be repeated from year to year.

Passenger mileage to and from other roads,	.	.	.	.	.
Number of tons carried,	.	.	.	.	.
Total freight mileage, or tons carried one mile,	.	.	.	.	.
Freight mileage to and from other roads,	.	.	.	.	.
Average rate of fare per mile (not including season tickets) received from passages on roads operated by this company,	.	.	.	.	.
Average rate of fare per mile received from passengers to and from other roads,*	.	.	.	.	.
Average rate of fare per mile from season-ticket passengers, reckoning two passengers per day to each ticket,	.	.	.	.	.
Average rate of freight per ton per mile on roads operated by this company,	.	.	.	.	.
Average rate of freight per ton per mile to and from other roads,*	.	.	.	.	.
Average number of cars in passenger trains,	.	.	.	.	.
Average number of cars in freight trains,	.	.	.	.	.
Number of persons regularly employed by company,	.	.	.	.	.

CLASSIFICATION OF BUSINESS.

Passengers coming from other States,	.	.	.	.	.
Passengers going to other States,	.	.	.	.	.
Passengers travelling only within this State,	.	.	.	.	.
Passengers to Boston (season ),	.	.	.	.	.
Passengers from Boston (season ),	.	.	.	.	.
Season,ticket passengers to be reckoned once a day each way.	.	.	.	.	.

FREIGHT IN TONS.	Brought from other States.	Carried to other States.	Carried within this State only.	Taken from Boston.	Carried to Boston.
Anthracite coal,
Bituminous coal,
Petroleum,
Iron and steel rails,
Castings and other iron,
Other metals,
Iron and other ores,
Stone and sand,
Lime and cement,
Lumber,
Live stock,
Dressed carcasses, smoked and salted meats,
Flour,
Grain,
Other Agricultural products,
Manufactures,†
Merchandise,†
Ice,
Other articles,

EXPENDITURES CHARGED TO CAPITAL ACCOUNT DURING THE YEAR.

Main line, extension or alteration of road,	.	.	.	.	.
Branches, extension or alteration, specifying each,	.	.	.	.	.
Double track extension,	.	.	.	.	.
Land,	.	.	.	.	.
Passenger and freight stations, wood-sheds and water stations,	.	.	.	.	.
Engine-houses, car-sheds and turn-tables,	.	.	.	.	.
New locomotives and snow-plows,	.	.	.	.	.
New passenger, mail and baggage cars,	.	.	.	.	.
New freight cars,	.	.	.	.	.
Machine-shops, machinery and tools,	.	.	.	.	.
Purchase of other roads, specifying what,	.	.	.	.	.
Subscriptions or loans to other roads, specifying what,	.	.	.	.	.
Any other expenditures charged to capital account,	.	.	.	.	.
Total,	.	.	.	.	.

* After deducting all allowances for tolls, or use of cars, &c.

† Manufactured articles starting from the place of manufacture, so far as known, are to be reckoned under the first head; after they have arrived at a depot for sale, they become a part of the general merchandise of the place, and on any second transit are to be reckoned under the second head.

The last two columns apply only to the roads terminating in Boston.

EXPENDITURES ON OPERATING ACCOUNT FOR THE YEAR.

Maintenance of Way and Buildings.

Repairs of road, exclusive of bridges and new rails (including labor and materials in new sidings),	.	.	.	.	.	.	.	.	.
New iron rails, deducting old rails sold,	.	.	.	.	.	.	.	.	.
Steel rails,	.	.	.	.	.	.	.	.	.
Repairs of bridges,	.	.	.	.	.	.	.	.	.
Repairs of buildings and fixtures,	.	.	.	.	.	.	.	.	.
Repairs of fences, road crossings and signs,	.	.	.	.	.	.	.	.	.
Removing ice and snow,	.	.	.	.	.	.	.	.	.
Total for maintenance of way and buildings,	.	.	.	.	.	.	.	.	.
Per mile of road kept in repair,	.	.	.	.	.	.	.	.	.
Per mile of single track kept in repair, not including sidings,	.	.	.	.	.	.	.	.	.
Total length of steel and steel-headed rail track now laid on the road,	.	.	.	.	.	.	.	.	.

Traffic Expenses.

[To include oil, fuel, clerks, watchmen and incidentals about shops.]

Repairs of locomotives and snow-plows,	.	.	.	.	.	.	.	.	.
New locomotives and snow-plows,	.	.	.	.	.	.	.	.	.
Repairs of machine-shops and machinery,	.	.	.	.	.	.	.	.	.
New machine-shops and machinery,	.	.	.	.	.	.	.	.	.
Repairs of passenger, baggage and mail cars,	.	.	.	.	.	.	.	.	.
New passenger, baggage and mail cars,	.	.	.	.	.	.	.	.	.
Repairs of freight and other cars,	.	.	.	.	.	.	.	.	.
New freight and other cars,	.	.	.	.	.	.	.	.	.
Fuel (for cars and engines)—number of cords of wood,	.	.	.	.	.	.	.	.	.
Fuel (for cars and engines)—number of tons of coal,	.	.	.	.	.	.	.	.	.
Oil and waste (for cars and engines),	.	.	.	.	.	.	.	.	.
Salaries, wages and incidentals, chargeable to passenger department,	.	.	.	.	.	.	.	.	.
Salaries, wages and incidentals, chargeable to freight department,	.	.	.	.	.	.	.	.	.
Wages of switchmen, gate-keepers, signal-men and watchmen, unless included above,	.	.	.	.	.	.	.	.	.
Gratuities and damages, passenger account,	.	.	.	.	.	.	.	.	.
Gratuities and damages, freight account,	.	.	.	.	.	.	.	.	.
Total,	.	.	.	.	.	.	.	.	.
Per mile of road operated,	.	.	.	.	.	.	.	.	.
Per mile of single track operated, not including sidings,	.	.	.	.	.	.	.	.	.

Miscellaneous.

Amount paid other companies for tolls on freight and passengers, or for use of cars, specifying each company and amount,*	.	.	.	.	.	.	.	.	.
Amount paid other companies as rent for use of road, specifying each company and amount,	.	.	.	.	.	.	.	.	.
Telegraph expenses,	.	.	.	.	.	.	.	.	.
United States taxes and stamps,	.	.	.	.	.	.	.	.	.
State taxes,	.	.	.	.	.	.	.	.	.
Local taxes,	.	.	.	.	.	.	.	.	.
Insurance, loss by fire, and damages paid for fires set by engines,	.	.	.	.	.	.	.	.	.
General salaries and office expenses, law expenses and all other expenses (except interest) not included in any of the above items,	.	.	.	.	.	.	.	.	.
Total miscellaneous,	.	.	.	.	.	.	.	.	.
Total expenditures for operating the road,	.	.	.	.	.	.	.	.	.
Per mile of road operated,	.	.	.	.	.	.	.	.	.
Per mile of single track operated, not including sidings,	.	.	.	.	.	.	.	.	.
Proportion for Massachusetts,	.	.	.	.	.	.	.	.	.

REVENUE FOR THE YEAR.

Receipts from passengers on roads operated by this company,	.	.	.	.	.	.	.	.	.
Receipts from passengers over other roads as toll or for use of cars,	.	.	.	.	.	.	.	.	.
Receipts from freight on roads operated by this company,	.	.	.	.	.	.	.	.	.
Receipts from freight over other roads as toll or for use of cars,	.	.	.	.	.	.	.	.	.
Receipts as rents for use of road,	.	.	.	.	.	.	.	.	.
Receipts for mails,	.	.	.	.	.	.	.	.	.
Receipts for express,	.	.	.	.	.	.	.	.	.
Total earnings,	.	.	.	.	.	.	.	.	.
Per mile of road operated,	.	.	.	.	.	.	.	.	.
Per mile of single track operated, not including sidings,	.	.	.	.	.	.	.	.	.
Proportion for Massachusetts,	.	.	.	.	.	.	.	.	.

* This is intended to include any allowance made other roads for the use of their cars, or any difference allowed to them between your regular fares and freight on your road, and the rates you receive for passengers and freight brought by or carried to these other roads. As this amount is charged here as an expense, the same amount must be included in the "receipts for passengers and freight," under the next head. In the case, however, of a *pro rata* division of fares and freight on several roads, constituting together a long line, the remarks as to difference of fares and freight would not apply. You will enter, however, in such case, under this head, anything allowed for use of cars, entering the same amount, also, on the other side with your receipts.

Income from other sources,	:	:	:	:	:	:	:	:	:	\$
Total Income,	.	.	.	.	.	.	.	.	.
NET INCOME, DIVIDENDS, &C.										
Total net income above operating expenses,	.	.	.	.	.	.	.	.	.
Paid for interest, .	.	.	.	.	.	.	.	.	.
Paid in dividends per cent. for the year,	.	.	.	.	.	.	.	.	.
Paid to sinking funds, .	.	.	.	.	.	.	.	.	.
Balance for the year or surplus,*	.	.	.	.	.	.	.	.	.
Surplus at commencement of the year,*	.	.	.	.	.	.	.	.	.
Total surplus,*	.	.	.	.	.	.	.	.	.
Invested as follows,	Cash and loans,	.	.	.	.	.	.	.	.
	Balance of accounts due from other roads,	.	.	.	.	.	.	.	.
	Other uncollected accounts,	.	.	.	.	.	.	.	.
	Materials for repairs,	.	.	.	.	.	.	.	.
	Fuel and stores,	.	.	.	.	.	.	.	.
	Any other items,	.	.	.	.	.	.	.	.

* In some former reports, surplus has been reported as embracing stocks and bonds, or real estate. Such amounts now are to be included under the head of "Income expended in construction, equipment and purchase of property," and the cost of each stated under the head of "Property purchased." Surplus is held to include only balance of operating accounts, not permanent investments; and unclaimed dividends, balance due other roads (if it is so), &c., are to be deducted from it, before reporting amount here. In case you have no surplus, and the balance turns out the other way, state the particulars of the deficiency.

GENERAL BALANCE SHEET AT LAST CLOSING OF ACCOUNTS.

LIST OF ACCIDENTS IN MASSACHUSETTS.

	FROM CAUSES BEYOND THEIR OWN CONTROL.		FROM THEIR OWN MISCONDUCT OR CARELESSNESS.		TOTAL.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Passengers,						
Employés,						
Others,						

STATEMENT OF EACH ACCIDENT.

NAME AND RESIDENCE OF OFFICERS.

PROPER ADDRESS FOR THE COMPANY.

Report of the.....

Street Railway Company,

FOR THE YEAR ENDING SEPTEMBER 30TH, 1871.

CAPITAL STOCK AND DEBTS.									
Capital stock authorized by charter,	.	.	.	.	.	.	.	.	.
Capital stock authorized by votes of company,	.	.	.	.	.	.	.	.	.
Capital stock paid in,	.	.	.	.	.	.	.	.	.
Capital stock paid in per mile of railway owned by company,	.	.	.	.	.	.	.	.	.
Funded debt, due	.	.	.	.	.	.	.	.	.
per cent. interest,	.	.	.	.	.	.	.	.	.
Unfunded debt, incurred for construction, equipment or purchase,	.	.	.	.	.	.	.	.	.
Total amount of debt,	.	.	.	.	.	.	.	.	.
Total amount of debt per mile of railway owned by company,	.	.	.	.	.	.	.	.	.
Amount of income expended in construction, equipment and purchase,	.	.	.	.	.	.	.	.	.
Total means expended in construction, equipment and purchase,	.	.	.	.	.	.	.	.	.
Number of stockholders,	.	.	.	.	.	.	.	.	.
COST OF RAILWAY.									
Railways and Branches built by Company.									
Grading and paving,	.	.	.	.	.	.	.	.	.
Track, including timber, rails, &c , and laying,	.	.	.	.	.	.	.	.	.
Interest during construction, commissions, discounts, &c., allowed to contractors and others,	.	.	.	.	.	.	.	.	.
Engineering, agencies, salaries and other expenses during construction,	.	.	.	.	.	.	.	.	.
Total cost of construction,	.	.	.	.	.	.	.	.	.
Average per mile of single track built by company, not including sidings, &c.,	.	.	.	.	.	.	.	.	.
Other Railways and Branches purchased.*									
, original cost,	.	.	.	.	.	.	.	.	.
purchased at	.	.	.	.	.	.	.	.	.
Total cost to this company of railways and branches purchased,	.	.	.	.	.	.	.	.	.
Total cost to this company of all railways built and purchased,	.	.	.	.	.	.	.	.	.
Average per mile of single track, not including sidings,	.	.	.	.	.	.	.	.	.
COST OF EQUIPMENT.									
Number of horses,	cost	.	.	.	.	.	.	.	.
Number of cars,	cost	.	.	.	.	.	.	.	.
Number of other vehicles,	cost	.	.	.	.	.	.	.	.
Land owned by company,	.	.	.	.	.	.	.	.	.
Buildings owned by company,	.	.	.	.	.	.	.	.	.
Other articles of equipment,	.	.	.	.	.	.	.	.	.
Total cost of equipment,	.	.	.	.	.	.	.	.	.
Average per mile of single track operated, not including sidings, &c.,	.	.	.	.	.	.	.	.	.
Total cost of railway and equipment,	.	.	.	.	.	.	.	.	.
Amount of sinking funds on hand to meet debt,	.	.	.	.	.	.	.	.	.
Property owned by company not needed for operating road,	.	.	.	.	.	.	.	.	.
DESCRIPTION OF RAILWAY.†									
Length of railway owned by company, with description of its several lines and branches, and length of each,	.	.	.	.	.	.	.	.	.
Length of railway laid with double track,	.	.	.	.	.	.	.	.	.
Aggregate length of switches, sidings, &c.,	.	.	.	.	.	.	.	.	.
Total length of track, measured as single track,	.	.	.	.	.	.	.	.	.
Total length of track paved,	.	.	.	.	.	.	.	.	.
Weight of rail per yard, and description of rail,	.	.	.	.	.	.	.	.	.
Length of railway belonging to other companies, measured as single track, not including sidings, &c., operated by this company, with description of same,	.	.	.	.	.	.	.	.	.
Total length of single track, not including sidings, &c., operated by this company,	.	.	.	.	.	.	.	.	.
MILES RUN, &C.									
Total number of miles run during the year,	.	.	.	.	.	.	.	.	.
Average cost per mile run,	.	.	.	.	.	.	.	.	.
Total number of passengers carried in the cars,	.	.	.	.	.	.	.	.	.
Total number of round trips for the year,	.	.	.	.	.	.	.	.	.
Average number of passengers per round trip,	.	.	.	.	.	.	.	.	.
Rate of speed adopted, including stops,	.	.	.	.	.	.	.	.	.
Number of persons regularly employed by company,	.	.	.	.	.	.	.	.	.
Rates of fare,	.	.	.	.	.	.	.	.	.
EXPENSES CHARGED TO CAPITAL ACCOUNT FOR THE YEAR.									
Extension of tracks,	.	.	.	.	.	.	.	.	.
New horses,	.	.	.	.	.	.	.	.	.
New cars, and other vehicles,	.	.	.	.	.	.	.	.	.
Land,	.	.	.	.	.	.	.	.	.
Buildings,	.	.	.	.	.	.	.	.	.
Total,	.	.	.	.	.	.	.	.	.

* Naming each road and cost of same.

† The lengths required to be given in miles and decimals.

EXPENSES OF OPERATING THE RAILWAY.						\$
Repairs of road-bed and track,	.	.	.	.	.	.
Repairs of cars and other vehicles, harness, and horse-shoeing,	.	.	.	.	.	.
Repairs of buildings,	.	.	.	.	.	.
Keeping good the stock of horses,	.	.	.	.	.	.
Wages and salaries of all persons employed, excepting president, treasurer and superintendent, and their clerks,	.	.	.	.	.	.
Provender,	.	.	.	.	.	.
United States taxes,	.	.	.	.	.	.
State taxes,	.	.	.	.	.	.
Local taxes,	.	.	.	.	.	.
Rent and tolls paid other companies for use of their roads, specifying amount to each,	.	.	.	.	.	.
Amount paid other companies for use of bridges and ferries, specifying amount to each,	.	.	.	.	.	.
Insurance,	.	.	.	.	.	.
Damages for injuries to persons,	.	.	.	.	.	.
General salaries, and office expenses, and all other expenses except interest not included above,	.	.	.	.	.	.
Total expenses,	.	.	.	.	.	.
Per mile of single track operated, not including sidings, &c.,	.	.	.	.	.	.
REVENUE FOR THE YEAR.						
Received from passengers on railways operated by this company, and for tickets sold,	.	.	.	.	.	.
Received from other railways, as tolls or rent, specifying amount from each,	.	.	.	.	.	.
Received for mails,	.	.	.	.	.	.
Received for sales of manure,	.	.	.	.	.	.
Total earnings,	.	.	.	.	.	.
Income from other sources,	.	.	.	.	.	.
Total income,	.	.	.	.	.	.
NET INCOME, DIVIDENDS, &c.						
Total net income above operating expenses,	.	.	.	.	.	.
Paid for interest,	.	.	.	.	.	.
Paid in dividends, per cent. for the year,	.	.	.	.	.	.
Paid to sinking funds,	.	.	.	.	.	.
Balance for the year, or surplus,	.	.	.	.	.	.
Surplus at commencement of year,	.	.	.	.	.	.
Total surplus,	.	.	.	.	.	.
Invested as follows, viz.:						
Cash and loans,	.	.	.	.	.	.
Materials for repairs,	.	.	.	.	.	.
Other items,	.	.	.	.	.	.
Amount of unredeemed tickets at end of year,	.	.	.	.	.	.

GENERAL BALANCE SHEET AT LAST CLOSING OF ACCOUNTS.

LIST OF ACCIDENTS IN MASSACHUSETTS.

	FROM CAUSES BEYOND THEIR OWN CONTROL.		FROM THEIR OWN MISCONDUCT . OR CARELESSNESS.		TOTAL.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Passengers,						
Employés,						
Others,						

STATEMENT OF EACH ACCIDENT.

NAME AND RESIDENCE OF OFFICERS.

PROPER ADDRESS FOR THE COMPANY.

[F .]

Commonwealth of Massachusetts.

In the Year One Thousand Eight Hundred and Seventy-One.

A N A C T

TO AMEND CHAPTER THREE HUNDRED AND SEVENTY-TWO OF THE ACTS OF THE YEAR EIGHTEEN HUNDRED AND SEVENTY, REQUIRING RAILROAD TRAINS TO BE FURNISHED WITH CERTAIN TOOLS AND APPLIANCES.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows :

SECTION 1. Section one of chapter three hundred and seventy-two of the acts of the year eighteen hundred and seventy is hereby amended, by striking out the words "two traversing jack-screws" in the third and fourth lines, and inserting in the fifth and sixth lines the words "ropes and chains suitable for hauling cars" instead of the words "chains, ropes and blocks suitable for hauling cars and engines."

SECTION 2. This act shall take effect upon its passage.

[G.]

Commonwealth of Massachusetts.

In the Year One Thousand Eight Hundred and Seventy-One.

A N A C T

REQUIRING SAFETY SWITCHES TO BE PLACED UNDER CERTAIN CIRCUMSTANCES IN THE MAIN LINES OF RAILROADS.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows :

SECTION 1. Every railroad hereafter constructed in this Commonwealth shall be equipped, throughout its main line of road, with the Tyler, or such other form of safety switch as shall previously receive the approval in writing of the board of railroad commissioners. All railroad corporations of this state, whenever any additional switches are placed in their main lines of road, or any switches now in use on their main lines of road, and of patterns not approved by the board of railroad commissioners, are worn out or require for any cause to be renewed, shall lay down in such main line only safety switches approved as aforesaid.

SECTION 2. Any railroad corporation disregarding the provisions of this act, shall forfeit to the Commonwealth the sum of two hundred dollars for each and every switch put down in violation of it, and a further sum of twenty-five dollars for each and every month that any such switch is kept in use. It shall be the duty of the railroad commissioners to see that this act is complied with, and the attorney-general shall sue for any forfeiture incurred under its provisions.

[The Tyler switch was referred to in the last report of the Hon. George B. Wright, commissioner of railroads and telegraphs in the State of Ohio, and a careful description of it can there be found. (Annual Report, 1869, p. 13.)]

[H .]

Commonwealth of Massachusetts.

In the Year One Thousand Eight Hundred and Seventy-One.

A N A C T

**TO REGULATE CHARGES FOR THE CARRIAGE OF MERCHANDISE ON
RAILROADS.**

*Be it enacted by the Senate and House of Representatives, in General Court
assembled, and by the authority of the same, as follows :*

SECTION 1. No railroad corporation of this Commonwealth shall charge or collect for the transportation of goods or merchandise for any shorter distance, any larger amount as toll or freight than is charged or collected for the carriage of similar quantities of the same class of goods over a longer distance upon the same road.

SECTION 2. Any railroad corporation offending against the provisions of this act, shall be liable for each offence to a penalty not less than fifty nor more than five hundred dollars, to be recovered by any party aggrieved in an action of tort.

[Laws of Michigan, 8d April, 1869, No. 109, § 17, cl. 9.]

[I.]

PETITION OF THE FITCHBURG RAILROAD COMPANY, *that the Board of Railroad Commissioners will fix and determine what compensation shall be made by the Boston, Clinton and Fitchburg Railroad Company, for entering on the Fitchburg Railroad, and for the past, present, and future use of said railroad and its appurtenances, &c.*

The facts in this case as they appeared by the statements of counsel, which were not controverted, are as follows:—

The Boston, Clinton & Fitchburg Railroad, which is the successor of the Fitchburg & Worcester Railroad, has a legal connection, by a suitable and convenient track, with the Vermont & Massachusetts Railroad, and with the Cheshire Railroad, which by lease uses the track of the Vermont & Massachusetts Railroad, in the town of Fitchburg. This connection is entirely independent of the Fitchburg Railroad, but for many years the Vermont & Massachusetts Railroad and the Cheshire Railroad, by some arrangement with the Fitchburg Railroad, have brought their freight trains upon the tracks and into the yard of the latter road, where the freight has been distributed or reloaded, and trains made up for further transportation over the Fitchburg Railroad and its connections, and the merchandise and cars consigned or directed to the Fitchburg & Worcester or Clinton line have been made up and delivered to said Clinton line. This labor of shifting merchandise and cars has been performed by the Fitchburg Railroad, over which road the greater part of the freight coming from the upper roads was transported to Boston or intermediate stations. No claim for compensation was ever made by the Fitchburg Railroad upon the Fitchburg & Worcester Railroad for thus shifting merchandise and cars; but since the completion of the Boston, Clinton & Fitchburg road and the opening of another and competing line between Fitchburg and Boston, a claim has been made for compensation for such labor upon all freight destined for Boston by this competing line, and upon no other. It appears also to have been the practice for the Vermont & Massachusetts and the Cheshire roads to load freight upon their roads, destined for the Fitchburg

and the Boston, Clinton & Fitchburg Railroads, indiscriminately, and to mix up in their trains cars destined for both roads, and to run them all into the yard of the Fitchburg Railroad, to be there assorted, reloaded and shifted as above stated.

A contract between the Fitchburg Railroad Company and the Vermont & Massachusetts Railroad Company was exhibited, which provides for the use of the Fitchburg track and appurtenances at Fitchburg by the Vermont & Massachusetts Railroad in making up trains in connection with the Fitchburg Railroad, and it appears to have been considered by the respondents that any labor performed by the Fitchburg Railroad upon cars and merchandise coming to their road from the Vermont & Massachusetts Railroad or the Cheshire Railroad, its tenant, was performed under that contract. The petitioners, however, denied that the contract was intended to cover or did cover the business coming to the Clinton line.

The commissioners do not deem it necessary to construe this contract or to take it into consideration. By section 114 of chapter 63 of the General Statutes, it is the duty of the Vermont & Massachusetts Railroad, and of the Cheshire Railroad, as its tenant, to deliver to the Boston, Clinton & Fitchburg Railroad, by its connecting track, all "merchandise consigned, ordered or directed to be sent" over said Boston, Clinton & Fitchburg Railroad; and by the same section the Fitchburg Railroad is forbidden to "receive and forward over *their* road any merchandise consigned, ordered or expressly directed to be forwarded over a different route." The objection is also reciprocal upon the Boston, Clinton & Fitchburg Railroad to deliver over its connecting track all "merchandise consigned, ordered or directed to be sent" over the Vermont & Massachusetts and Cheshire Railroads.

Whatever, therefore, may be the construction of the above-mentioned contract, as between the Fitchburg and the Vermont & Massachusetts Railroads, it cannot change the obligations of the Vermont & Massachusetts Railroad, or the Cheshire Railroad as its tenant, under the law, to deliver freight consigned to the Boston, Clinton & Fitchburg Railroad as a connecting road; nor can it give to the Fitchburg Railroad any claim against the Boston, Clinton & Fitchburg Railroad for any service performed in relation to any merchandise consigned to the latter road from the Vermont & Massachusetts or Cheshire roads.

The board, therefore, find that the service undoubtedly performed by the Fitchburg Railroad Company in loading and unloading freight and making up trains destined for the Boston, Clinton &

Fitchburg Railroad, so far as it concerns merchandise consigned to said Boston, Clinton & Fitchburg Railroad, has been performed by said Fitchburg Railroad Company as agents and servants of the Vermont & Massachusetts and the Cheshire Railroad Companies, and that their claim for compensation, if any, for service so performed, is upon said companies, and not upon the Boston, Clinton & Fitchburg Railroad Company.

And for the future the board advise all the railroad companies above named to conform strictly to the provisions of section 114 of chapter 63 of the General Statutes, unless amicable arrangements can be made for the mutual use of each other's premises in the transfer of freight to connecting lines.

COMPLAINT OF THE SELECTMEN OF WAREHAM, *on petition of C. F. A. Weston and others, concerning rates of freight on cord-wood on the Cape Cod Railroad.*

This matter was referred to Mr. Appleton, who met several of the petitioners and Mr. Winslow, superintendent of the Cape Cod Railroad, at Wareham, and heard the evidence which was offered. It appeared that in old times, before the building of the railroad, a great deal of wood was sent away by coasters from this section of the country for the supply of Newport, New York and other places. After the railroad was built, it furnished a better market for wood, and the coasters withdrew and went into other business. Of late years, the railroad company have used coal chiefly for fuel, and the demand for wood has fallen off. New York and other places in that direction are now supplied by coasters from Virginia cheaper than it can be done from the Cape section. The owners of wood, therefore, looking round for a possible market, concluded that Boston was the best place for them, but, on consulting the printed tariff of rates of transportation, thought it was too high to leave them any profit. These tariff rates, of course, are fixed for small quantities, and it is usual on all railroads to make deductions on such rates for large quantities. None of the petitioners had been to see Mr. Winslow, or communicated with him in any way, to ascertain whether he would make any deductions from the printed rates. After some discussion on the matter, Mr. Winslow named a price, \$3.50 per cord from Wareham and Agawam to Boston, for quantities of fifty cords and upwards, which the petitioners present expressed themselves satisfied with. No further action, therefore, was required from the board of railroad commissioners.

COMPLAINT OF THE SELECTMEN OF WAREHAM, *on the petition of C. F. A. Weston and others, relative to a dangerous crossing of the Cape Cod Railroad in that town.*

This matter was also referred to Mr. Appleton, who visited the crossing referred to, and heard the statements of the petitioners and the superintendent of the road. There is an unobstructed view of the railroad on both sides of the crossing for some distance, and it is not at all dangerous in the sense of being hidden or obscure. The crossing itself is on a bridge over the river, and as the bridge is placed obliquely to the parts of the road on each side of it, the track of the railroad becomes nearly parallel to the line of common travel for vehicles on the bridge. If the crossing had been left, as is common on road crossings, with a square recess between the plank and the rails, there would be danger of light vehicles twisting their wheels off in the cavity. But here unusual care has been taken to chamfer off the edges of the plank, so that in this respect the crossing resembles the track of a horse-railroad, and is no more dangerous than such tracks are in the streets of a city. But in consequence of the oblique position of the bridge to the other parts of the road, the track of the common travel comes very near the corner of the bridge railing, and there is a possibility of accidents there in a dark night. This, however, does not appear to be caused by the construction of the railroad, but is a consequence of the location of the town road itself. Moreover, it is claimed by the railroad company that this crossing was accepted by the county commissioners when the railroad was first built as sufficient and proper, and that no complaints have been made of it before. Mr. Appleton suggested to the parties that the road might be much improved by widening the eastern causeway leading to the bridge on the northern side of it, and widening the bridge to meet it so as to render the crossing more direct, and remove the projecting angle of the bridge railing; and Mr. Appleton proposed, as a fair and equitable division of the cost of the improvement, that the town should widen the causeway, and the railroad company should widen the bridge. Mr. Winslow, for the railroad company, agreed to do so. The selectmen reserved the matter for consideration.

Another crossing in the neighborhood was also brought to Mr. Appleton's notice, viz., that of branch tracks leading to Tobey's Wharf, crossing the same town road near the end of another bridge. As the bridge is three or four feet higher than the tracks, and the descent is made in twenty feet or less, the pitch is quite abrupt and the crossing rather inconvenient. As the road on the other side of

the crossing rises also, Mr. Appleton suggested that the tracks should be raised one or two feet. The railroad company are willing to do this if consented to by all interested. This, however, would make it necessary to raise the tracks on the wharf also, and perhaps the wharf owner may object to this. How far the legal rights of the wharf owner give him power in the premises, Mr. Appleton is not aware; these branch tracks were authorized in the original charter of the railroad company. Should there be any difficulty in making the change suggested, Mr. Appleton also pointed out another way in which the crossing might be improved, viz., by dropping the cap on the first bend of piles in the bridge about one foot, and thus make the descent more gradual. The expense of this alteration would be small, and it would belong to the town to make the change. If the tracks are raised, the expense would be more, but the railroad company are willing to do it as far as and including the road crossing. No further action in this case appears to be necessary on the part of the railroad commissioners. Mr. Appleton will suggest, however, that under chapter 63 of the General Statutes, a greater power over railroad crossings is vested in the county commissioners than has been entrusted to this board, and that if any parties remain dissatisfied with the existing state of things in regard to these crossings, their proper course is to apply to the county commissioners.

COMPLAINT OF THE SELECTMEN OF FREETOWN, *on the petition of Paul M. Burns and others, concerning rates of freight on cord-wood on the New Bedford & Taunton Railroad.*

This was a complaint of the selectmen of Freetown in the county of Barnstable, on the petition of certain citizens of that town, in regard to alleged excessive charges of the New Bedford & Taunton Railroad Company for the transportation of cord-wood. A hearing before the full board was had in relation to the matter at the station in East Freetown, and in New Bedford, on the 2d day of August; numerous witnesses were examined and counsel heard in behalf of both parties. The following are the essential facts in the case :—

The New Bedford & Taunton Railroad Company, from the time it first went into operation in 1840 down to the year 1853, had been in the custom of charging a certain amount per mile for the carriage of wood by the cord on their cars, but the minimum amount charged for any distance of carriage was 75 cents per cord.

About the year 1853 this minimum charge was increased, and further increases were from time to time made until it reached \$1.50, at which figure it now stands. This charge, the petitioners alleged, was excessive, out of proportion to the charges made for the carriage of other and similar articles of merchandise, and intended by the company to discourage the sale of the wood on the line of their road. Other petitions of a similar nature had also been received by this board from the inhabitants of the same district of country, all practically based on the same belief, that the railroads, being themselves necessarily large consumers of wood, sought, by means of excessive charges on the transportation of the commodity, to secure a practical monopoly of all of it grown in the districts through which they passed.

In order to justify any action on the part of this board, it was necessary for the petitioners to prove at least one of three propositions:

1. That the charges of the New Bedford & Taunton Railroad Company for the transportation of cord-wood were excessive, as compared with those of other companies; or

2. That they were excessive as compared with the charges for other commodities of like bulk and weight as transported by themselves; or

3. That the New Bedford & Taunton Railroad could, for exceptional reasons, transport, with a fair profit to themselves, cord-wood at unusually low freights.

A comparison of printed tariffs shows that the following freights are exacted on a number of the roads of this Commonwealth for the carriage of this article:—

	Per Cord, Ten Miles.	Minimum Charge.
Boston & Providence,	\$1 25	\$1 25
Old Colony & Newport,	1 75	1 75
Boston & Lowell,	1 25	80
Eastern (dry hard),	1 75	1 00
“ (dry soft),	1 25	
Boston & Maine,	1 50	1 50
Fitchburg (hard),	2 25	1 75
“ (soft),	1 75	1 40
Cape Cod,	1 50	1 50
Average,	\$1 58	\$1 37

The Boston, Hartford & Erie, Connecticut River and Vermont & Massachusetts Railroads transport wood by special contract in all cases.

On a comparison of these figures it would appear that the charge complained of is \$1.50 as against \$1.37, the average charge on six other roads ;—the commissioners are of opinion, therefore, that the petitioners have failed to establish any practice of excessive charges against the corporation respondent as compared with other roads of this Commonwealth.

As regards the freight charged by this company for the transportation of wood, as compared with that charged for the transportation of other articles of similar bulk and weight, the following figures are drawn from the tariff of the road. In order to reduce articles to an equality, the cord of wood is estimated at the average weight of dry hard fire-wood, as established by evidence in this case, being 4,000 lbs. to the cord :—

ARTICLES.	PER TON.			
	From Taunton to New Bedford, 20 miles.	From Myrick's to New Bedford, 14 miles.	East Freetown to New Bedford, 10 miles.	East Freetown to New Bedford on basis of rate from Taunton.
Wood (4,000 lbs. per cord),	\$0 75	\$0 75	\$0 75	\$0 75
Fence posts (per ton),	1 40	1 20	80	70
Lumber,	1 40	1 20	80	70
Ship timber,	1 40	1 20	80	70
Shooks,	1 40	1 20	80	70
Bricks, stone, iron,	1 40	1 20	80	70
Hay,	1 40	1 20	80	70
Potatoes,	1 40	1 20	80	70
Average (exclusive of wood),	\$1 40	\$1 20	\$0 80	\$0 70

The average charge deduced from this table would seem to be eighty cents per ton for the distance of ten miles, that being the distance between East Freetown and Taunton or New Bedford, the two points to which the complainants desire to transport their wood. From this comparison it does not appear that the petitioners have established the existence of any excessive charge for the transportation of wood as compared with the average of similar articles specified on the tariff of the company. Some evidence was offered tending to show that as compared with one or two articles, either not appearing on the tariff or subject to special rates, the charge is apparently heavy ; but the consideration shown as regards these articles was explained by the company on the ground of a desire, as in one case, that of ship-timber, to encourage an important and languishing interest at their terminal point ; or, as in the case of box-board logs, not published on the tariff, by a special contract with manufacturers for the carriage of large quantities at the convenience of the com-

pany. The officers of the road, at the same time, declared themselves ready to make similar contracts with any other persons on the same terms. The commissioners give but little weight to the reasons given for the first of these exceptions, and the last is based on a necessary rule of all roads which enables them to carry large quantities at rates for which they could not afford to carry single articles or small quantities. The commissioners, however, cannot make the exception, the rule. The comparison must be made with the average, not the lowest, freight charged. If the commissioners assumed the exception as the standard, they must, on petition therefor, recommend a reduction to that rate on all other articles specified in the tariff as well as cord-wood. As compared with the average, the charge complained of cannot be said to be excessive.

It remains to consider whether any exceptional reason exists why the New Bedford & Taunton Railroad Company should be able to transport fire-wood at unusually low rates and with a fair profit to themselves. In deciding this question the commissioners must bear in mind the right every railroad company has to a fair and reasonable profit for all services which it is called upon to perform. In this particular case, as in many others, it is very true that the paying that profit to the corporation may constitute a heavy and, perhaps, fatal burden to some essential local interest; this, however, is an argument which must be urged on the direction of the road, but cannot affect the decision of this board. As commissioners, we do not feel at liberty to recommend any company to forego its fair and reasonable profits and to do business at a loss, however much such a course on their part might recommend itself to our judgments as individuals. In this case, for instance, the petitioners represent almost the only local interest on the line of this road; they are poor, and seeking to extract a living from a very penurious soil; this concession they believe would be to them of great moment, while, whether they are right or not, it would at most constitute a small matter which would certainly not perceptibly affect in any way the receipts of the road; the yielding it by the company would tend to establish a feeling of good nature and friendliness on the line of the road, while insisting upon it keeps alive a sentiment of strong irritation. These considerations, however, cannot affect the present decision. This board cannot decide that a charge, not materially in excess of the average charge on similar articles, is unreasonable, unless, as already stated, it is prepared to go on, and, when petitioned, to remodel the whole tariff of this and all other roads, on the basis thus laid down. Such a course is at present out of the question. The commissioners must, in every case not based on general complaints of extortion, assume that the average charge on similar services is reasonable, and hav-

ing ascertained that, assume it as the standard. Taking this as their rule of action the commissioners are of opinion that the petitioners failed to establish any exceptional reason why the corporation respondent could carry wood fuel at unusually low rates, saving to themselves a fair and reasonable profit.

While arriving, therefore, at the conclusion that nothing was proved by the petitioners which would justify any recommendation to the corporation respondent in this particular case, there is one point to which the board desires to call attention. As already stated other complaints to this board have been based on the popular impression that the corporations, with a view to their own necessities, desire to establish a species of monopoly of the wood fuel along the line of their roads. The commissioners, after a careful investigation, are unable to discover any solid ground for this impression. Few of the roads now burn wood fuel in their locomotives, and the amount so consumed is continually decreasing. The roads, however, still are, and must continue to be considerable buyers of wood. They require it both for kindling and warming purposes. One of the roads of the Commonwealth during the last year was a buyer of wood to the amount of \$305,743; and the New Bedford & Taunton Railroad Company itself bought nearly twice as many cords of wood (947) as it did tons of coal (543). On examining the tariffs of the several roads it will be found that cord-wood is always specially provided for. Unlike all other products of the forest it, and it alone, has almost invariably a minimum rate provided of \$1.25 to \$1.75 per cord. It is unnecessary to discuss the occasion of this exception. It may well be that, in earlier and cheaper days, the roads did desire to keep the fuel along their lines from the market, realizing that they must some day need it themselves, and established this especial tariff to protect it, and that in those days it was sufficient for that end. The exception, then established, may have been insensibly continued to this day. However this may be, no reason for the exception seems to exist now, and the fact is undeniable, that it is made the occasion of a very considerable jealousy and ill-feeling towards the corporations in many localities. The officials claim, and the commissioners are inclined to think, there is no good ground for this, but its existence they do not dispute. Under these circumstances, and while refraining from any special action in this case, the commissioners would strongly recommend to the New Bedford & Taunton Railroad Company, and to all other corporations making a similar special rule, a change in their tariffs, classifying cord-wood with other descriptions of products of the forest, such as fence-posts, sleepers, shooks, lumber, ship-timber, &c., and charging it at the same rate. The cord would then be estimated at 4,000 weight,

for dry hard-wood. This charge would remove all grounds of complaint, and would not, according to the evidence of the officials in this case, materially reduce receipts.

HEARING in the matter of the re-location of the Passenger Station and Freight Depots of the Providence & Worcester Railroad, in the town of Millbury.

The proceedings in this case were had under chapter 130 of the Acts of 1870, which authorized the Providence & Worcester Railroad Company "to re-locate its passenger station and freight depots in the town of Millbury, as the board of railroad commissioners shall recommend." Petitions, extensively signed by the residents and business men of Millbury, had on two occasions been forwarded to the board of direction of the Providence & Worcester Railroad, urging a change in location, and, in accordance with these, this board was requested by the directors to hear the evidence and arguments presented in the case, and to render a decision upon it. In compliance with this request, the 27th-28th September were fixed for a hearing, upon which days all the parties in interest appeared personally or by counsel, the premises were viewed, the evidence of the petitioners for, and of the remonstrance against, a removal was received and the case was argued.

The railroad corporation was represented at the hearing by a committee of its directors, but was not a party to the discussion. The object it had in view was simply the accommodation of the public, and the committee desired only to inform itself as to what was the general desire, and what arrangements on the part of the road were best calculated to meet the general wants.

The following are the essential facts of the case as they were put in evidence. The present station was located and the buildings erected at the time the road was built, about the year 1845. The inhabitants of the town were then consulted in regard to location, and their expressed wishes were complied with. Since that time the industry of the town has greatly developed, the water privileges have been improved, and the centre of population has changed, no less than the requirements of business. It was, on all sides, conceded that the present buildings are insufficient, and that new ones must soon be constructed. The remonstrants against any change of location insisted that, by opening a certain new road, the present site would be made the most accessible to the centres both of trade and of population in the vicinity. The petitioners argued that another site, a short distance off, but on a different road, was

more accessible, and was favored by a large preponderance of popular feeling.

Were the question one simply of originally locating a station, the commissioners would have had no difficulty in arriving at a conclusion. The site designated by the petitioners is unquestionably the one best adapted to station purposes. The present buildings are placed upon a grade, on a sharp, reversed curve, and are crowded in between converging thoroughfares, the Blackstone River and a ledge of rocks;—the site is both inconvenient and dangerous, and to satisfactorily improve it, would be both difficult and expensive. Indeed, great doubts must be entertained whether it admits of any enlargement sufficient to accommodate the natural increase of business through any considerable period of years. On the other hand the site favored by the petitioners is well adapted to depot purposes, and, though directly at the commencement of a curve on its south side, is on a level road. As regards the relative natural advantages of the two sites for the purposes in view, the commissioners can, therefore, entertain no doubts.

This, however, is not a case of original location. It involves other and very grave considerations. The railroad station is necessarily the central point in a town like Millbury. Almost every house, every mill and every workshop is, to a certain extent, dependent upon it; they have acquired more or less of value from, if indeed they have not been purposely constructed with a view to, their proximity to the railroad depot. These arrangements for business or residence are by no means to be disregarded. In the very careful consideration the commissioners gave to this case, therefore, they fully adopted the principle laid down by the counsel for the remonstrants, that, to justify any removal a very decided preponderance of public convenience and popular desire should be manifested. Established arrangements on the strength of which investments have been made and industrial enterprises built up, are not to be disturbed for light cause. A slight balance of advantages, or desire, in such cases is not sufficient; a heavy burden of proof rests upon the innovators.

The statistics put into the case by the petitioners for a change were certainly entitled to great weight. The project of a removal had received the written approval of 298 out of the 503 voters resident in the town. These petitioners represented \$15,241 out of \$23,720, the total tax paid in the town. As regards the use made of the railroad, those signing the petitions paid, it appeared, for freights received \$2,937, and the remonstrants \$2,814; and for outward freights the petitioners paid \$1,835, and the remonstrants \$1,475.

As regards tonnage, the petitioners, it appeared, received 1,648 tons and the remonstrants 768 tons, not including coal. The outward relative tonnage was not put in evidence except as regards freights paid.

As regards distance, it was in evidence that such of the petitioners as lived west of the railroad now had to travel at least 110 rods further to reach the present depot of the Providence & Worcester Railroad than they would have to travel to reach a depot on the site proposed. Petitioners living east of the railroad would not be materially affected by the change. Of the remonstrants, those living in the neighborhood of the Cardis Mills, so called, would have to go about 30 rods further than they now do to reach the proposed site, and those living near the Simpson Mills, so called, about 100 rods further. But the remonstrants have in their immediate neighborhood the depot of the branch of the Albany road, which is 100 rods nearer to the Cardis Mills and 25 rods nearer the Simpson Mills than the present Providence & Worcester depot, while it is nearly half a mile further from the petitioners on the west side of the railroad than the location they ask for.

These various facts would certainly seem to indicate a very considerable preponderance, both as regards public convenience and the popular desire, in favor of the change requested by the petitioners. The remonstrants, on the other hand, introduced evidence tending to show that the undeveloped water-power of the locality was in that part of the town represented by them, and that nearly one-half of the freight forwarded to the road came from the mills owned and operated by them.

Under these circumstances the commissioners are called upon to decide whether a preponderance of evidence is established of a nature so overwhelming as to warrant the recommendation by them of a change of location. In case of any doubt existing in this respect, the remonstrants would, of course, be entitled to the benefit of it. One remaining consideration, however, obviated the necessity of weighing the evidence on this point, and was conclusive in the minds of the commissioners. The whole case of the remonstrants depended upon the construction of a new thoroughfare between the present depot site and the more recently developed portion of the town, known as Bramanville. It is unnecessary for the commissioners to consider either the feasibility of this road or the cost of constructing it. Upon both of these points different views were expressed. Two things, however, are clear: 1st, that, unless this road is constructed, the advantages of location, both for passengers and freight, are overwhelmingly in favor of the proposed new location; and, 2d, that the construction of this road is a con-

tingency over which the railroad commissioners have no control. The road may or may not be built; if it is built, it may or may not be available for heavy teaming. In any case it does not now exist, and the commissioners are not disposed to disregard the fact of an overwhelming present necessity because of a contingent future remedy. It appeared that this road had long been a subject of controversy in the town; that several times the constructing of it had been discussed in town meeting and uniformly voted down. The remonstrants alleged that this had been done solely by those dissatisfied with the present depot site; in fact, by the petitioners, and with no reason but to prevent a settlement of the depot question and to secure a removal. This, again, may or may not be the case. It is not for this commission to go behind the reiterated record of a town meeting, and to discuss the motives of a majority. The record was in evidence, and from it, it was apparent that the thoroughfare, the necessity of which to the present depot site the remonstrants concede, is not viewed with favor by a majority of the voters in the town. Even allowing the force of the explanation of this action of the town meeting given by the remonstrants, the adverse decision still remains a very significant indication of the preponderance of popular feeling. The commissioners, however, cannot excuse themselves in ignoring overwhelming considerations in favor of something over which they have control, because of the possible happening of something else over which they have no control.

They feel additional confidence in arriving at this conclusion from the peculiar character of the chief interests likely to be unfavorably affected by this removal. With few exceptions these were of a manufacturing character, and the change was deprecated on account of the increased distance of teaming involved in it. The Providence & Worcester Railroad has, however, always pursued a liberal policy as regards local freight delivery. The company intimated a willingness at the hearing to preserve the present location for freighting purposes, even after a removal, and it has never evinced any unwillingness to construct private turnouts and dumping places wherever a reasonable demand for such was proved to exist. Under these circumstances the remonstrants did not seem in great danger of the inconveniences they peculiarly apprehended.

For the reasons stated, the commissioners would recommend the Providence & Worcester Railroad Company to re-locate the station in question in general accordance with the desires of the petitioners. Should any further, or more detailed expression of opinion in the premises by this board be desired, it will be furnished on application therefor by the corporation interested.

Tabular Abstract of Accidents on Horse Railroads reported to the Railroad Commissioners, from December 1, 1869, to September 30, 1870.

RAILROADS.	Whole No. Injured.	Passengers.	Others.	Children.	Adults.	Fatal.	Not Fatal.	PASSENGERS.				OTHERS.	
								Getting on or off cars in motion.	Getting on or off or falling from front platform.	Fatal.	Not Fatal.	Fatal.	Not Fatal.
Metropolitan,	7	6	1*	-	7	5†	2	6	3	5	1	-	1
Lynn and Boston,	1	1	-	-	1	1	-	1	1	1	-	-	-
Salem Street,	1	1	-	-	1	-	1	1	-	-	1	-	-
Stoneham Street,	1	1	-	1	-	1	-	1	1	1	-	-	-
Union,	2	2	-	-	2	-	2	2	1	-	2	-	-
Totals,	12	11	1	1	11	7	5	11	6	7	4	-	1

* Employé. † Including one uncertain cause of death.

NOTE.—A comparison with the Annual Reports shows that the Metropolitan, the Lynn and Boston, the Salem, the Lowell, and the South Boston Railways, have not reported to this board all the accidents at the time they occurred; the last two roads making no reports whatever.

[L.]

Commonwealth of Massachusetts.

In the Year One Thousand Eight Hundred and Seventy-One.

A N A C T

TO REGULATE THE TRANSPORTATION OF NITRO-GLYCERINE AND OTHER
EXPLOSIVE SUBSTANCES.

*Be it enacted by the Senate and House of Representatives in General Court
assembled, and by the authority of the same, as follows :*

SECTION 1. Whoever knowingly delivers or causes to be delivered to any person or corporation, being a common carrier of passengers, for transportation in or upon any steamboat or other vessel, railroad car, carriage or other vehicle used for the transportation of passengers within this Commonwealth, or places or causes to be placed in or upon any steamboat or other vessel, railroad car, carriage or other vehicle so used for the transportation of passengers, any of the substances or articles known as nitro-glycerine or glycerin oil, nitro-leum or blasting oil, or nitrated oil, or powder mixed with any such oil, or fibre saturated therewith, or dynamite, shall be liable to a fine of not less than five hundred nor more than five thousand dollars; and any person or corporation, being a common carrier of passengers, who shall knowingly receive for transportation, or shall transport any of said articles in or upon any steamboat or other vessel, railroad car, carriage or other vehicle used for the transportation of passengers, or in any railroad car attached to any train used for the transportation of passengers, within this Commonwealth, shall be liable to a fine of not less than five hundred nor more than five thousand dollars.

SECTION 2. In case the death of any person shall be caused by the explosion of any of said articles while the same is being placed in or upon any such steamboat or other vessel, railroad car, carriage or other vehicle used for the transportation of passengers, or while the same is being transported thereon or is being removed therefrom, every person who knowingly placed or aided in or permitted the

placing of said article in or upon such vessel or vehicle for transportation shall be deemed guilty of manslaughter, and on conviction thereof shall be punished by imprisonment in the state prison not exceeding five years or by fine not exceeding one thousand dollars and imprisonment in the jail not exceeding one year.

SECTION 3. None of the articles named in the first section of this act shall be transported in any quantity in or upon any vessel or vehicle whatever within this Commonwealth unless the same shall be securely enclosed or packed in a metallic vessel surrounded by plaster of paris or other material that will be non-explosive when saturated with such article, and the outside of the package containing the same shall be marked, printed or labelled in a conspicuous manner "NITRO-GLYCERINE, DANGEROUS;" and whoever shall violate the provisions of this section shall be liable to a fine of not less than five hundred, nor more than five thousand dollars.

[Laws of U. S., 3d July, 1866; 14 U. S. Statutes at Large, 81.]

[M.]

EXPENSES OF OFFICE OF BOARD OF RAILROAD COMMISSIONERS
FOR THE YEAR ENDING DECEMBER 31, 1870.

Rent of office,	\$550 00
Carpet, furniture and fixtures,	569 79
Printing and advertising,	348 05
Books, maps, periodicals and binding,	93 10
Postage and express,	83 72
Stationery,	36 30
Care of office, messenger and labor,	78 70
Fuel,	39 00
Sundry incidentals,	30 25
	<hr/>
	\$1,828 91

Received of railroad corporations for printing their
annual reports, and paid into the treasury of the
Commonwealth, \$1,300 00

RAILROAD REPORTS,

FOR THE TEN MONTHS ENDING

September 30, 1870.

R E P O R T

OF THE

ATHOL AND ENFIELD RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

Capital stock authorized,	\$500,000 to \$700,000 00
Number of shares of capital stock issued,	None.
Capital paid in since last report,	25,000 00
Total amount of capital stock paid in,	25,000 00
For graduation and masonry, paid during the past year [including engineering],	18,000 00
Total amount expended for graduation and masonry [including engineering],	18,000 00
For land, land-damages and fences, paid during the past year,	1,200 00
Total amount expended for land, land-damages and fences,	1,200 00
Length of main road in this State,	30 miles.
Whole length of road unfenced on both sides,	30 miles.
Number of public ways crossed at grade, [and] number of railroads crossed at grade.	
Not fully located, therefore cannot answer.	

The foregoing is all the return that can be made under the present uncompleted state of the road.

WILLIS PHELPS,
RUFUS D. WOODS,
EDWARD SMITH,
W. B. KIMBALL,
J. W. GOODMAN,
C. SOUTHWORTH,
S. P. BAILEY,
T. H. GOODSPEED,

Directors of the Athol and Enfield Railroad Corporation.

HAMPSHIRE ss. October 15, 1870. Then personally appeared Willis Phelps, Rufus D. Woods, Edward Smith, W. B. Kimball, J. W. Goodman, C. Southworth, S. P. Bailey, and T. H. Goodspeed, and severally made oath to the truth of the foregoing statement by them subscribed.

Before me,

CHARLES RICHARDS, *Justice of the Peace.*

BERKSHIRE RAILROAD CORPORATION.

[The Report of this Railroad (not received at date of printing), will be found on a subsequent page. See Index.]

R E P O R T

OF THE

BOSTON AND ALBANY RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	\$26,000,000 00
2. Number of shares of capital stock issued,	191,508
3. Increase of capital, since last report, [in shares,]	27,392
4. Capital paid in, per last report,	16,411,600 00
5. Capital paid in, since last report,	2,739,200 00
6. Total amount of capital stock paid in,	19,150,800 00
7. Amount realized in cash value for stock issued,	17,150,800 00
8. Funded debt, per last report,	2,873,020 00
9. Funded debt, paid since last report,	1,074,520 00
10. Funded debt, increase of, since last report,	-
11. Total present amount of funded debt,	1,798,520 00
12. Floating debt, per last report,	1,235,000 00
13. Floating debt, paid since last report,	1,200,000 00
14. Floating debt, increase of, since last report,	435,000 00
15. Total present amount of floating debt,	470,000 00
16. Total present amount of funded and floating debt,	2,268,520 00
17. Whole amount in cash value realized from funded and floating debts,	7,939,520 00
18. Whole amount in cash value realized from stock and debts,	25,090,320 00
19. Average rate of interest per annum paid during the year,	5 to 6 per cent.
20. Maximum amount of debts during the year,	4,108,020 00
COST OF ROAD AND EQUIPMENT.	
21. For graduation and masonry, per last report,	\$4,567,291 81
22. For graduation and masonry, paid during the past year,	15,740 68
23. Total am't expended for graduation and masonry,	\$4,583,032 49
24. For wooden [and iron] bridges, per last report,	519,047 67
25. For wooden [and iron] bridges, paid during the past year,	56,956 42
26. Total amount expended for wooden bridges,	576,004 09
27. Total amount expended for iron bridges, (if any,) [included with wooden,]	-
28. For superstructure, including iron, per last report,	3,766,805 40
29. For superstructure, including iron, paid during the past year,	80,289 19
30. Total amount expended for superstructure, including iron,	3,847,094 59
31. For stations, buildings and fixtures, per last report,	1,661,082 58

32. For stations, buildings and fixtures, paid during the past year,	\$278,453 10	
33. Total amount expended for stations, buildings and fixtures,		\$1,939,535 68
34. For land, land-damages and fences, per last report,	2,115,835 42	
35. For land, land-damages and fences, paid during the past year,	157,091 09	
36. Total amount expended for land, land-damages and fences,		2,272,926 51
37. For locomotives, per last report,	964,870 17	
38. For locomotives paid during the past year,	75,000 00	
39. Total amount expended for locomotives,		1,039,870 17
40. For passenger and baggage cars, per last report,	246,800 58	
41. For passenger and baggage cars paid during the past year,	36,000 00	
42. Total amount expended for passenger and baggage cars,		282,800 58
43. For merchandise cars, per last report,	1,386,167 03	
44. For merchandise cars paid during the past year,	152,500 00	
45. Total amount expended for merchandise cars,		1,538,667 03
46. For engineering, per last report,	390,974 31	
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		390,974 31
49. For agencies and other expenses, per last report,	1,019,157 41	
50. For agencies and other expenses, paid during the past year,	-	-
51. Total amount expended for agencies and other expenses,		1,019,157 41
[Grand Junction R. R., . . . \$1,051,908 33]	}	1,378,751 26
[Added this year, including mortgage paid to E. R. R., . . . 326,842 93]		
[Albany & W. Stockbridge R. R.,]		
[Hudson and Boston,]		
[W. Stockbridge R. R. stock,]		
[South Boston Flats,]		2,411,055 75
52. Amounts of discounts or other sacrifices on stock and bonds issued,		203,036 01
53. Total cost of road and equipment,		13,000 00
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans,; stocks and bonds, real estate,; fuel,		442,722 73
55. Income expended in construction and equipment,	-	-
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	162	55-100 miles.
57. Length of main road in other States, (specifying how much in each,)	38	10-100 miles. N. York.
58. Length of single main track,	25-	100 miles.
59. Length of double main track,	200	40-100 miles.
60. Length of branches owned by the Company, stating whether they have a single or double track, and specifying length in this State, and in each other State,)	}	47 43-100 miles, single; 2 2-10 miles, double.
61. Aggregate length of sidings, and other tracks, excepting main track and branches,		
62. Length of roads belonging to other companies operated by this Company,	88	6-100 miles.
63. Total miles of road operated by this Company,	18	65-100 m. P. and N. A.
64. Weight of rail, per yard, in main road,	269	63-100 miles.
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	60 to 80	lbs.
	56, 57, 62, 64	27-100 lbs.

66. Maximum grade, with its length, in main road,	83 feet, 1½ miles.
67. Maximum grade, with its length, in branch roads,	188 feet for 1,000 feet.
68. Total rise and fall in main road,	5,607 feet.
69. Total rise and fall in branch roads,	901 6-10 feet.
70. Shortest radius of curvature, with length of curve, in main road,	600 for 900 feet.
71. Shortest radius of curvature, with length of curve, in branch roads,	414 for 120 feet.
72. Total degrees of curvature in main road,	8,225°
73. Total degrees of curvature in branch roads,	1,864° 28'
74. Total length of straight line in main road,	88 36-100 miles.
75. Total length of straight line in branches,	20 7-10 miles.
76. Aggregate length of wooden truss bridges,	6,524 95-100 feet.
77. Aggregate length of all other wooden bridges,	5,092 7-10 feet.
78. Aggregate length of iron bridges,	125 feet.
79. Whole length of road unfenced on both sides,	14,592 feet.
80. Number of public ways crossed at grade,	195
81. Number of railroads crossed at grade,	10
82. Remarks,	None.
83. Way stations for express trains,	13
84. Way stations for accommodation trains,	61
85. Flag stations,	2
86. Whole number of way stations,	74
87. Whole number of flag stations,	2

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains,	905,053	
89. Miles run by freight trains,	1,887,995	
90. Miles run by other trains,	84,492	
91. Total miles run,		2,877,540
92. Number of passengers carried in the cars,	3,754,733	
93. Number of passengers carried one mile,	78,808,929	
94. Number of tons of merchandise carried in the cars,	1,531,149	
95. Number of tons of merchandise carried one mile,	148,891,491	
96. Number of passengers carried one mile, to and from other roads,	32,885,728	
97. Number of tons carried one mile, to and from other roads,	30,383,615	
98. Rate of speed adopted for express passenger trains, including stops,	30 miles per hour.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	32 miles per hour.	
100. Rate of speed adopted for accommodation trains,	25 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	25 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	—	—
103. Average rate of speed adopted for freight trains, including stops,	15 miles per hour.	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile,	42,021,424	
105. Estimated weight in tons of merchandise cars (not including freight,) hauled one mile,	178,645,788	

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$704,727 28
--	--------------

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

107. For repairs of wooden bridges,	\$44,374 96	
108. For wages of switchmen, average per month, \$50 00		} Total,
109. For wages of gate-keepers, average per month, 50 00		
110. For wages of signal-men, average per month, 50 00		
111. For wages of watchmen, average per month, 50 00		
112. Number of men employed, exclusive of those engaged in construction,	4,361	
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	7,965 90	
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,	4,900 00	
115. Total for maintenance of way,	\$761,968 14	
MOTIVE POWER AND CARS.		
116. For repairs of locomotives,	\$307,995 28	
117. For new locomotives, to cover depreciation,	60,000 00	
118. For repairs of passenger cars,	155,860 16	
119. For new passenger cars, to cover depreciation,	30,000 00	
120. For repairs of merchandise cars,	293,020 47	
121. For new merchandise cars, to cover depreciation,	30,000 00	
122. For repairs of gravel and other cars,	10,000 00	
123. Total for maintenance of motive power and cars,	\$886,875 91	
124. Number of engines,	163	
125. Number of passenger cars,	118	
[Also 98-234 parts of 46 first-class cars, and 4 cars for express, and 5 post-office cars for government, and 12 baggage cars; also, 2-5 of 2 passenger cars and 2 baggage cars on steamboat train.]		
126. Number of baggage cars,	40	
127. Number of merchandise cars,	3,045	
128. Number of gravel cars,	137	
MISCELLANEOUS.*		
129. For fuel used by engines during the year, viz. :—		
1. Wood, No. of cords, 25,046. Cost of the same,	\$146,397 97	
2. Coal, number of tons, (reckoning '2,240 lbs. to the ton,) 46,548. Cost of same,	395,244 53	
[Coal for other purposes,]	20,082 75	
130. For oil used by cars and engines,	50,402 50	
131. For waste and other material for cleaning,	19,938 26	
132. For salaries, wages and incidental expenses, chargeable to passenger department,	} 995,574 99	
133. For salaries, wages and incidental expenses, chargeable to freight department,		
134. For gratuities and damages,	67,567 07	
135. For taxes and insurance,	105,415 71	
136. For ferries,	16,200 00	
137. For repairs of station buildings, aqueducts, fixtures, furniture,	132,421 82	
138. For renewals of iron, including laying down,	307,226 00	
139. For new iron laid down, deducting the value of old iron taken up,	None.	

* See note on preceding page.

140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	None.	
141. For amount paid other companies, as rent for use of their roads, specifying each company,	None.	
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	\$50,357 67	
143. Total miscellaneous,		\$2,306,829 27
144. Total expenditures for working the road,		3,955,673 32
145. Total amount of interest paid during the year, [and exchange,]		315,893 13
INCOME DURING THE YEAR.*		
146. <i>For Passengers:</i> —		
1. On main road, including branches owned by company,	}	\$2,188,192 20
2. To and from other roads, specifying what,		
147. <i>For Freight:</i> —		
1. On main road and branches owned by Co.,	}	3,265,481 67
2. To and from other connecting roads,		
148. U. S. mails,		60,000 00
149. Rents,		55,017 56
[Other sources,]		217,295 71
150. Total income,		\$5,785,987 14
151. Net earnings, after deducting expenses,		1,830,813 82
DIVIDENDS.		
152. 5 per cent. [July dividend.] Total, [and government tax,]		\$863,189 45
[Dividend to P. and No. Adams Railroad,]		\$13,500 00
153. Surplus not divided,		637,731 24
154. Surplus last year,		1,752,774 35
155. Total surplus; cash and loans, ; stocks and bonds, ; real estate, fuel,		2,890,505 59
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ.:		
156. Of road and bridges,	—	—
157. Buildings,	—	—
158. Engines and cars,	—	—
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage, of road and franchise or any property of the corporation, per last report,	\$2,119,520 00	
160. Mortgage debt paid since last report,	1,049,000 00	
161. Increase of mortgage debt since last report,	—	—
162. Present amount of mortgage debts,	1,070,520 00	
163. Number of mortgages, on road and franchise or any property of the corporation,	Two.	

ACCIDENTS.

December 4, 1869.—Dennis Keerman and his wife Mary Keerman, while attempting to cross the track near Kinderhook, were struck by the engine and killed.

December 9.—Alex'r Ferguson, an employé, was run over in the yard at Greenbush and killed.

December 9.—Mary McKenney, while walking upon the track at South Framingham, was run over and killed.

December 14.—Stephen Bell was run over and killed at Kinderhook.

December 15.—Patrick Quinn, while standing between the tracks at Natick, was struck by the engine and killed.

December 18.—Felix O'Brien was killed by gravel train near Back Bay, Boston.

January 11, 1870.—John Mackey, an employé, was caught between the cars at Greenbush and killed.

January 14.—Richard B. Haskell, while crossing the track near Becket, was struck by the engine and killed.

January 20.—Mrs. John Grant stepped from passenger train at Boston while in motion, fell, was run over, and died same day.

January 28.—Charles Pero, while walking upon the track near Rochdale, was run over and killed.

February 3.—Charles W. Sproung, Miles Phillips, Henry Siple, employés, were killed near Chatham, by freight train breaking in two parts and running back into the train following.

February 12.—Patrick Burns, an employé, was struck by bridge near Chatham and killed.

February 19.—G. H. Annable, an employé, was struck by a freight train in Boston, and died on the 26th.

March 10.—Kydon LaCarver, while walking upon the track at Worcester, was run over and killed.

March 24.—Frederick L. Leonard, Jr., jumped from train, near West Springfield Common, while at full speed, fell, and was killed.

April 4.—Thomas Lanian, while getting upon an engine at Greenbush, fell, was run over and killed.

April 7.—Wm. Noodle, a boy, while playing upon top of freight cars at Greenbush, fell, was run over and killed.

April 25.—Willie Parker, a child two and one-half years of age, strayed away from home upon the track near New Worcester, was struck by express train and killed.

May 7.—John Daily threw himself under the train at South Framingham, and was killed.

May 9.—Dennis Donovan, while walking upon the track near Palmer, was struck by the train and killed.

May 26.—David J. Hogan, while attempting to get on freight train at Palmer, fell, was run over and killed.

May 31.—John H. Williams, while lying upon the track near Russell, was struck by the engine and died June 2d.

June 4.—Mary Hanley, a child four years old, was run over at East Boston by a small platform car and killed.

June 22.—Andrew Fayhee, while standing upon the track at Pittsfield, was struck by an engine and killed.

June 23.—Timothy Cronan was killed at Worcester by an explosion in car 2,689, while riding without authority upon the hind end of the car.

June 23.—Charles E. Valentine, while attempting to get upon passenger train in motion at West Newton, fell, was run over and died same day.

June 27.—Margaret Callanane, about eleven years old, while playing upon the track at Brookline, was run over and died same day.

July 11.—Michael Lee, while lying upon the track near State line, was run over and died same day.

July 18.—James G. Jackson, an employé, while coupling cars at Palmer, was crushed and died same day.

July 23.—Charles E. Peabody jumped from train at Wellesley, fell, was run over and killed.

July 25.—George Hubbard, while crossing the track near Indian Orchard, was struck by the engine and killed.

August 3.—George L. Barrett, an employé, while adjusting screens to drawing-room car upon the outside, was struck by bridge, near West Brookfield, and died same day.

August 6.—Michael O'Neil fell from freight train, near Milldam in Boston, and died August 8th.

August 18.—Nelson Clark, an employé, was killed at Washington while coupling cars.

August 22.—James Conger, while walking upon the track near Needham, was struck by the engine and killed.

August 26.—Edward Brown, while standing upon the track at Greenbush, was struck by an engine and killed.

August 30.—Patrick Simmons, an employé, was crushed between the cars near Maple Grove and killed.

September 2.—Roger Feeney, an employé, was killed by gravel train on Back Bay, Boston.

September 9.—John Williams fell from train near Natick, was run over and killed.

September 12.—Rev. Thos Sullivan, while attempting to get upon passenger train while in motion, fell, was injured, and died September 14th at Worcester.

September 27.—Patrick Kenned, while walking upon the track near New Worcester, was struck by the engine and killed.

C. W. CHAPIN,
D. WALDO LINCOLN,
J. STICKNEY,
JONA. D. WHEELER,
AVERY PLUMER,
DANIEL DENNY,
GINERY TWICHELL,
STEPH'N M. CROSBY,
CHARLES J. KITTREDGE,
MOSES KIMBALL,
HENRY COLT,
IGNATIUS SARGENT,

Directors of the Boston and Albany Railroad Corporation.

SUFFOLK ss. November 2, 1870. Then personally appeared C. W. Chapin, D. Waldo Lincoln, J. Stickney, Jona. D. Wheeler, Avery Plumer, Daniel Denny, Ginery Twichell, Stephen M. Crosby, Charles J. Kittredge, Moses Kimball, Henry Colt, Ignatius Sargent, and severally made oath to the truth of the foregoing statement by them subscribed.

Before me,

CHAS. E. STEVENS, *Justice of the Peace.*

R E P O R T

OF THE

BOSTON, BARRE & GARDNER RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized, [fixed by vote of Directors at \$800,000,]		\$1,000,000 00
2. Number of shares of capital stock issued, . . .	98	
3. Increase of capital since last report, . . .	-	-
4. Capital paid in, per last report, . . .	\$104,200 00	
5. Capital paid in since last report, . . .	61,990 00	
6. Total amount of capital stock paid in, . . .		166,190 00
7. Amount realized in cash value for stock issued, . . .	-	-
8. Funded debt, per last report, . . .	-	-
9. Funded debt paid since last report, . . .	-	-
10. Funded debt, increase of, since last report, . . .	-	-
11. Total present amount of funded debt, . . .	-	-
12. Floating debt, per last report, . . .	1,000 00	
13. Floating debt paid since last report, . . .	1,000 00	
14. Floating debt, increase of, since last report, . . .	40 87	
15. Total present amount of floating debt, . . .		40 87
16. Total present amount of funded and floating debt, . . .		40 87
17. Whole amount in cash value realized from funded and floating debts, . . .	40 87	
18. Whole amount in cash value realized from stock and debts, . . .	166,230 87	
19. Average rate of interest per annum paid during the year, . . .	7 per cent.	
20. Maximum amount of debts during the year, . . .	1,000 00	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report, . . .	-	-
22. For graduation and masonry paid during the past year, . . .	\$89,322 83	
23. Total am't expended for graduation and masonry, . . .		\$89,322 83
24. For wooden bridges, per last report, . . .	-	-
25. For wooden bridges paid during the past year, . . .	-	-
26. Total amount expended for wooden bridges, . . .	-	-
27. Total amount expended for iron bridges, (if any,) . . .	-	-
28. For superstructure, including iron, per last report, . . .	-	-
29. For superstructure, including iron, paid during the past year, . . .	2,007 27	
30. Total amount expended for superstructure, including iron, . . .		2,007 27
31. For stations, buildings and fixtures, per last report, . . .	-	-
32. For stations, buildings and fixtures paid during the past year, . . .	-	-

33. Total amount expended for stations, buildings and fixtures,	-	-
33. Total amount expended for stations, buildings and fixtures,	-	-
34. For land, land-damages and fences, per last report,	-	-
35. For land, land-damages and fences paid during the past year,	\$26,836 53	
36. Total amount expended for land, land-damages and fences,		\$26,836 53
37. For locomotives, per last report,	-	-
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,	-	-
40. For passenger and baggage cars, per last report,	-	-
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,	-	-
43. For merchandise cars, per last report,	-	-
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,	-	-
46. For engineering, per last report,	2,401 29	
47. For engineering paid during the past year,	9,858 33	
48. Total amount expended for engineering,		12,259 62
49. For agencies and other expenses, per last report,	353 77	
50. For agencies and other expenses paid during the past year,	7,087 91	
51. Total amount expended for agencies and other expenses,		7,441 68
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,		137,867 93
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, \$33,108.26; stocks and bonds, ; real estate,; fuel,	33,108 26	
55. Income expended in construction and equipment,	-	-
INCOME DURING THE YEAR.*		
146. For Passengers:—		
1. On main road, including branches owned by company,	-	-
2. To and from other roads specifying what,	-	-
147. For Freight:—		
1. On main road and branches owned by Co.,	-	-
2. To and from other connecting roads,	-	-
148. U. S. mails,	-	-
149. Rents, [Interest, per last report, \$17.06; interest during the last year, \$4,728.26,]	\$4,745 32	
150. Total income,		\$4,745 32
151. Net earnings, after deducting expenses,	-	-

IVERS PHILLIPS,
 LEVI HEYWOOD,
 STEPHEN SALISBURY,
 I. N. ROSS,
 GEORGE W. GILL,
 R. C. TAYLOR,
 CALVIN FOSTER,
 H. N. TOWER,
 WM. H. MORSE,

Directors of the Boston, Barre and Gardner Railroad Corporation.

Worcester ss. November 1, 1870. Then personally appeared Ivers Phillips, Levi Heywood, Stephen Salisbury, I. N. Ross, George W. Gill, R. C. Taylor, Calvin Foster, H. N. Tower, Wm. H. Morse, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

CHARLES M. MILES, *Justice of the Peace.*

R E P O R T

OF THE

BOSTON, CLINTON & FITCHBURG R. R. CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$1,503,800 00
2. Number of shares of capital stock issued,		
[Guaranteed, 600 ; common, 1,794 ; pref., 6,332,]	8,726	
3. Increase of capital since last report,	None.	
4. Capital paid in, per last report,	\$872,600 00	
5. Capital paid in since last report,	None.	
6. Total amount of capital stock paid in,		872,600 00
7. Amount realized in cash value for stock issued,	872,600 00	
8. Funded debt, per last report,	648,000 00	
9. Funded debt paid since last report,	None.	
10. Funded debt, increase of, since last report,	152,500 00	
11. Total present amount of funded debt,		800,500 00
12. Floating debt, per last report,	104,954 56	
13. Floating debt paid since last report,	-	-
14. Floating debt, increase of, since last report,	83,697 35	
15. Total present amount of floating debt,		188,651 91
16. Total present amount of funded and floating debt,		989,151 91
17. Whole amount in cash value realized from funded and floating debts,	939,001 91	
18. Whole amount in cash value realized from stock and debts,	1,061,251 91	
19. Average rate of interest per annum paid during the year,	6 3-5	
20. Maximum amount of debts during the year,	1,000,000 00	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$449,327 47	
22. For graduation and masonry paid during the past year,	813 00	
23. Total am't expended for graduation and masonry,		\$450,140 47
24. For wooden bridges, per last report,	39,855 57	
25. For wooden bridges paid during the past year,	None.	
26. Total amount expended for wooden bridges,		39,855 57
27. Total amount expended for iron bridges, (if any,)	None.	
28. For superstructure, including iron, per last report,	419,491 74	
29. For superstructure, including iron, paid during the past year,	2,742 00	
30. Total amount expended for superstructure, including iron,		422,233 74
31. For stations, buildings and fixtures, per last report,	62,132 41	
32. For stations, buildings and fixtures paid during the past year,	8,717 32	

33. Total amount expended for stations, buildings and fixtures,		\$71,849 73
34. For land, land-damages and fences, per last report,	\$105,555 86	
35. For land, land-damages and fences paid during the past year,	100 00	
36. Total amount expended for land, land-damages, and fences,		105,655 86
37. For locomotives, per last report,	95,346 88	
38. For locomotives paid during the past year,	48,500 00	
39. Total amount expended for locomotives,		143,846 88
40. For passenger and baggage cars, per last report,	62,024 42	
41. For passenger and baggage cars paid during the past year,	37,898 88	
42. Total amount expended for passenger and baggage cars,		99,923 30
43. For merchandise cars, per last report,	117,265 09	
44. For merchandise cars paid during the past year,	34,000 00	
45. Total amount expended for merchandise cars,		151,265 09
46. For engineering, per last report,	28,957 52	
47. For engineering paid during the past year,	None.	
48. Total amount expended for engineering,		28,957 52
49. For agencies and other expenses, per last report,	37,140 19	
50. For agencies and other expenses paid during the past year,	None.	
51. Total amount expended for agencies and other expenses,		37,140 19
52. Amounts of discounts or other sacrifices on stock and bonds issued,	50,150 00	
53. Total cost of road and equipment,		1,601,013 35
54. Amount of assets or property held by the corporation in addition to the cost of the road; cash and loans, \$68,789.91; stocks and bonds, \$85,000; real estate,; fuel, \$15,000,	168,789 91	
55. Income expended in construction and equipment,	-	-

CHARACTERISTICS OF ROAD.

56. Length of main road in this State,	42 872-1,000 miles.
57. Length of main road in other States, (specifying how much in each,)	None.
58. Length of single main track, [7,750 feet of this may be termed Marlborough Branch, as through trains do not pass over it,]	42,872-1,000 miles.
59. Length of double main track,	None.
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	None.
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	7 miles,
62. Length of roads belonging to other companies operated by this Company,	21 251-1,000 miles.
63. Total miles of road operated by this Company,	64 122-1,000 miles.
64. Weight of rail, per yard, in main road,	50 lbs., 52, 54 and 56.
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	None.
66. Maximum grade, with its length, in main road,	{ 84 feet per mile for 2,000 feet near Marlborough. No other over 60 feet.
67. Maximum grade, with its length in branch roads,	None.
68. Total rise and fall in main road,	894 95-100
69. Total rise and fall in branch roads,	None.

70. Shortest radius of curvature, with length of curve, in main road,	788 feet for 110 feet.	
71. Shortest radius of curvature, with length of curve, in branch roads,	-	-
72. Total degrees of curvature in main road,	2,479° 35'	
73. Total degrees of curvature in branch roads,	None.	
74. Total length of straight line in main road,	23 789-1,000 miles.	
75. Total length of straight line in branches,	None.	
76. Aggregate length of wooden truss bridges,	260 50-100 feet.	
77. Aggregate length of all other wooden bridges,	176 feet.	
78. Aggregate length of iron bridges,	None.	
79. Whole length of road unfenced on both sides,	None.	
80. Number of public ways crossed at grade,	57	
81. Number of railroads crossed at grade,	2	
82. Remarks,	No.	
83. Way stations for express trains,	4 stations.	
84. Way stations for accommodation trains,	14 stations.	
85. Flag stations,	4 stations.	
86. Whole number of way stations,	14 stations.	
87. Whole number of flag stations,	4 stations.	
DOINGS DURING THE YEAR.*		
88. Miles run by passenger trains,	108,207	
89. Miles run by freight trains,	77,832	
90. Miles run by other trains,	-	-
91. Total miles run,		186,039
92. Number of passengers carried in the cars,	623,750	
93. Number of passengers carried one mile,	9,486,106	
94. Number of tons of merchandise carried in the cars,	165,145 tons.	
95. Number of tons of merchandise carried one mile,	4,854,350 tons.	
96. Number of passengers carried one mile, to and from other roads,	7,976,821	
97. Number of tons carried one mile, to and from other roads,	4,486,275	
98. Rate of speed adopted for express passenger trains, including stops,	30 miles an hour.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	30 miles an hour.	
100. Rate of speed adopted for accommodation trains,	25 miles an hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	26 miles an hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	17 miles an hour.	
103. Average rate of speed adopted for freight trains, including stops,	15 miles an hour.	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile,	3,185,500	
105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile,	9,754,900	
EXPENDITURES FOR WORKING THE ROAD.*		
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$33,272 50	
107. For repairs of wooden bridges,	None.	

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

108. For wages of switchmen, average per month,	\$50 00	} Total,	\$4,598 22
109. For wages of gate-keepers, average per month,	25 00		
110. For wages of signal-men, average per month,	50 00		
111. For wages of watchmen, average per month,	50 00		
112. Number of men employed, exclusive of those engaged in construction,	309		
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	5 10		
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,	212 69		
115. Total for maintenance of way,			\$38,088 51

MOTIVE POWER AND CARS.

116. For repairs of locomotives,	\$10,675 93		
117. For new locomotives, to cover depreciation,	-		-
118. For repairs of passenger cars,	7,675 40		
119. For new passenger cars, to cover depreciation,	-		-
120. For repairs of merchandise cars,	7,236 24		
121. For new merchandise cars, to cover depreciation,	-		-
122. For repairs of gravel and other cars,	-		-
123. Total for maintenance of motive power and cars,			\$25,587 57
124. Number of engines,	13		
125. Number of passenger cars,	17		
126. Number of baggage cars,	10		
127. Number of merchandise cars, [95 box cars, 60 peat, 50 coal, 14-26 of 37 8-wheel freight,]	226		
128. Number of gravel cars,	None.		

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz.:—		} \$49,871 56	
1. Wood, number of cords, 4,641½. Cost of the same,			
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 1,957. Cost of same,			
130. For oil used by cars and engines,	4,541 20		
131. For waste and other material for cleaning,	1,189 04		
132. For salaries, wages, and incidental expenses, chargeable to passenger department,	23,735 01		
133. For salaries, wages, and incidental expenses, chargeable to freight department,	39,197 67		
134. For gratuities and damages,	1,952 79		
135. For taxes and insurance,	7,361 92		
136. For ferries,	None.		
137. For repairs of station buildings, aqueducts, fixtures, furniture,	1,720 70		
138. For renewals of iron, including laying down,	-		-
139. For new iron laid down, deducting the value of old iron taken up,	21,778 79		
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	-		-
141. For amount paid other companies, as rent for use of their roads, specifying each company,	-		-

* See note on preceding page.

142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	\$14,889 47	
143. Total miscellaneous,		\$166,188 15
144. Total expenditures for working the road,		229,864 23
145. Total amount of interest paid during the year,		
[Interest on bonds, \$45,396 63]	}	53,624 89
[Interest on loan, 8,228 26]		
		<hr/> \$283,489 12

INCOME DURING THE YEAR.*

146. <i>For Passengers</i> :—		
1. On main road, including branches owned by company,	\$119,626 18	
2. To and from other roads, specifying what, .		
[Vt. and M., Cheshire, B. and Albany, Taunton Branch, B. & P. R.R., W. & N.,]	-	-
147. <i>For Freight</i> :—		
1. On main road and branches owned by Co.,	154,834 27	
2. To and from other connecting roads,		
[Vt. and M., Cheshire, B. & A. R. R., Taunton Branch, B. & P. R. R., W. & N.,]	-	-
148. U. S. mails,	3,230 76	
149. Rents,	8,589 47	
150. Total income,		\$286,280 68
151. Net earnings, after deducting expenses,	2,791 56	

DIVIDENDS.

152. 6 per cent. Total, [on \$60,000 guaranteed stock,]		\$3,600 00
153. Surplus not divided,	-	-
154. Surplus last year,	\$31,650 79	
[Used of surplus to pay dividend on guaranteed stock,]	808 44	
155. Total surplus; cash and loans, ;		
stocks and bonds, ; real estate,		
fuel,		\$30,842 35

ESTIMATED DEPRECIATION BEYOND THE RENEWALS,
VIZ. :—

156. Of road and bridges,	None.
157. Buildings,	None.
158. Engines and cars,	None.

MORTGAGE DEBTS.

159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last report,	\$648,000 00
160. Mortgage debt paid since last report,	None.
161. Increase of mortgage debt since last report,	152,500 00
162. Present amount of mortgage debts,	800,500 00
163. Number of mortgages on road and franchise, or any property of the Corporation,	Two.

ACCIDENT.

Rufus B. Heywood crushed between two cars that he was repairing in yard, caused by train backing up, engineer not knowing he was there. Date, December 10. Received fatal injuries.

LYMAN NICHOLS,
FRANCIS B. FAY,
E. A. HARRIS,
JOHN H. LOCKEY,
HALE W. PAGE,
GEO. A. TORREY,
GEO. E. TOWNE,
WM. D. PECK,
H. A. BLOOD,

Directors of the Boston, Clinton and Fitchburg Railroad Corporation.

FITCHBURG, WORCESTER, ss. November 12, 1870. Then personally appeared Lyman Nichols, E. A. Harris, John H. Lockey, Hale W. Page, Geo. A. Torrey, Geo. E. Towne, Wm. D. Peck and H. A. Blood, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

E. D. HEWINS, *Justice of the Peace.*

FITCHBURG, WORCESTER, ss. November 12, 1870. Then personally appeared Francis B. Fay, and affirmed to the truth of the foregoing statement by him subscribed.

Before

E. D. HEWINS, *Justice of the Peace.*

BOSTON, HARTFORD AND ERIE R. R. CORPORATION.

[The Report of this Railroad, (not received at date of printing), will be found on a subsequent page. See Index.]

BOSTON AND LOWELL RAILROAD CORPORATION.

[The Report of this Railroad (not received at date of printing), will be found on a subsequent page. See Index.]

REPORT

OF THE

BOSTON AND MAINE R. R. CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	\$5,000,000 00
2. Number of shares of capital stock issued,	45,500
3. Increase of capital since last report,	Nothing.
4. Capital paid in, per last report,	\$4,471,274 52
5. Capital paid in since last report,	Nothing.
6. Total amount of capital stock paid in,	4,471,274 52
7. Amount realized in cash value for stock issued,	4,471,274 52
8. Funded debt, per last report,	Nothing.
9. Funded debt paid since last report,	Nothing.
10. Funded debt, increase of, since last report,	Nothing.
11. Total present amount of funded debt,	Nothing.
12. Floating debt, per last report,	217,437 00
13. Floating debt paid since last report,	Nothing.
14. Floating debt, increase of, since last report,	232,563 00
15. Total present amount of floating debt,	450,000 00
16. Total present amount of funded and floating debt,	450,000 00
17. Whole amount in cash value realized from funded and floating debts,	450,000 00
18. Whole amount in cash value realized from stock and debts,	4,921,274 52
19. Average rate of interest per annum paid during the year, [last ten months,]	6 63-100 per cent.
20. Maximum amount of debts during the year, [last ten months,]	505,000 00
COST OF ROAD AND EQUIPMENT.	
21. For graduation and masonry, per last report,	\$886,067 40
22. For graduation and masonry paid during the past year, [last ten months,]	6,511 79
23. Total amount expended for graduation and masonry,	\$892,579 19
24. For wooden bridges, per last report,	371,468 55
25. For wooden bridges paid during the past year, [last ten months,]	Nothing.
26. Total amount expended for wooden bridges,	371,468 55
27. Total amount expended for iron bridges, (if any,) [none charged to construction,]	None.
28. For superstructure, including iron, per last report,	1,021,173 89
29. For superstructure, including iron, paid during the past year, [last ten months,]	Nothing.
30. Total amount expended for superstructure, including iron,	1,021,173 89

31. For stations, buildings and fixtures, per last report,	\$784,295 56	
32. For stations, buildings and fixtures paid during the past year, [last ten months,]	27,566 55	
33. Total amount expended for stations, buildings and fixtures,		\$811,862 11
34. For land, land-damages and fences, per last report,	1,042,462 37	
35. For land, land-damages and fences paid during the past year, [last ten months,]	17,052 25	
36. Total amount expended for land, land-damages, and fences,		1,059,514 62
37. For locomotives, per last report,	284,800 00	
38. For locomotives paid during the past year, [last ten months,]	12,000 00	
39. Total amount expended for locomotives,		296,800 00
40. For passenger and baggage cars, per last report,	128,786 56	
41. For passenger and baggage cars paid during the past year, [last ten months,]	12,000 00	
42. Total amount expended for passenger and baggage cars,		140,786 56
43. For merchandise cars, per last report,	303,132 71	
44. For merchandise cars paid during the past year, [last ten months,]	Nothing.	
45. Total amount expended for merchandise cars,		303,132 71
46. For engineering, per last report,	} In agencies below.	
47. For engineering paid during the past year, [last ten months,]		
48. Total amount expended for engineering,		
49. For agencies and other expenses, per last report,	273,827 50	
50. For agencies and other expenses, paid during the past year, [last ten months,]	850 25	
51. Total amount expended for agencies and other expenses,		274,677 75
52. Amounts of discounts or other sacrifices on stock and bonds issued,	78,725 48	
53. Total cost of road and equipment,		5,171,995 38
54. Amount of assets or property held by the corporation in addition to the cost of the road;* cash and loans, \$16,625.98; stocks and bonds, \$258,464.48; real estate, ; fuel, \$27,167.45,	302,257 91	
55. Income expended in construction and equipment,	Nothing.	
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	36½ miles.	
57. Length of main road in other States, (specifying how much in each,)	} 35 miles in N. H., and 2½ miles in Maine.	
58. Length of single main track,		46 47-100 miles.
59. Length of double main track,		27 79-100 miles.
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	} Medford Br., 2 miles; Methuen Br., 3½ miles (1 mile double track), in Mass.; Gt. Falls Br., 2½ miles in N. H.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,		35 miles, 2,822 feet.
62. Length of roads belonging to other companies operated by this Company,	65 miles.	
63. Total miles of road operated by this Company,	144 miles.	
64. Weight of rail, per yard, in main road,	} Nearly 3 miles, 48 lbs. per yard; balance, 56 and 60 lbs.	

* After deducting amount earned to pay dividend, January 1, 1871, and adjusted and unadjusted liabilities.

65. Weight of rail, per yard, in branch roads (specify the different weights per yard,)	48, 56, 58 and 60 lbs.
66. Maximum grade, with its length, in main road,	47 ft. per mile for 77-100 mls.
67. Maximum grade, with its length, in branch roads,	{ 36 ft. per mile for 1 40-100 miles.
68. Total rise and fall in main road,	1,498 feet.
69. Total rise and fall in branch roads,	146 feet.
70. Shortest radius of curvature, with length of curve, in main road,	{ 1,050 ft. radius; length, 1,150 feet.
71. Shortest radius of curvature, with length of curve, in branch roads,	{ 1,000 ft. radius; length, 1,150 feet.
72. Total degrees of curvature in main road,	1,988°
73. Total degrees of curvature in branch roads,	456°
74. Total length of straight line in main road,	49 73-100 miles.
75. Total length of straight line in branches,	5 31-100 miles.
76. Aggregate length of wooden truss bridges,	2,359 feet.
77. Aggregate length of all other wooden bridges,	6,901 feet.
78. Aggregate length of iron bridges,	106 feet.
79. Whole length of road unfenced on both sides,	1½ miles.
80. Number of public ways crossed at grade,	98
81. Number of railroads crossed at grade,	3 horse and 4 steam.
82. Remarks,	None.
83. Way stations for express trains,	None.
84. Way stations for accommodation trains,	20
85. Flag stations,	7
86. Whole number of way stations,	20
87. Whole number of flag stations,	7

DOINGS DURING THE YEAR.* [LAST TEN MONTHS.]

88. Miles run by passenger trains,	543,454	
89. Miles run by freight trains,	270,301	
90. Miles run by other trains,	35,937	
91. Total miles run,		849,692
92. Number of passengers carried in the cars,	3,127,328	
93. Number of passengers carried one mile,	44,032,919	
94. Number of tons of merchandise carried in the cars,	346,452	
95. Number of tons of merchandise carried one mile,	13,399,312	
96. Number of passengers carried one mile, to and from other roads,	10,070,563	
97. Number of tons carried one mile, to and from other roads,	5,291,979	
98. Rate of speed adopted for express passenger trains, including stops,	80 miles per hour.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	28 miles per hour.	
100. Rate of speed adopted for accommodation trains,	24 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	23 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	20 miles per hour.	
103. Average rate of speed adopted for freight trains, including stops,	12 miles per hour.	
104. Estimated weight, in tons, of passenger cars, (not including passengers,) hauled one mile,	15,896,965	
105. Estimated weight, in tons, of merchandise cars, (not including freight,) hauled one mile,	18,462,709	

* All items under the headings marked with an asterisk, are required by law for " the total miles of road operated by this company."

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron, .	\$125,737 85	
107. For repairs of wooden bridges,	40,368 23	
108. For wages of switchmen, average per month,	\$44 87	} Total,
109. For wages of gate-keepers, average per month,	48 79	
110. For wages of signal-men, average per month,	26 56	
111. For wages of watchmen, average per month,	48 93	
112. Number of men employed, exclusive of those engaged in construction,	880	
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	3,256 28	
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses, .	10,250 03	
115. Total for maintenance of way,		\$223,376 14

MOTIVE POWER AND CARS.

116. For repairs of locomotives,	\$41,168 12	
117. For new locomotives, to cover depreciation, .	12,000 00	
118. For repairs of passenger cars,	38,849 71	
119. For new passenger cars, to cover depreciation, .	12,000 00	
120. For repairs of merchandise cars,	28,861 49	
121. For new merchandise cars, to cover depreciation, .	Nothing.	
122. For repairs of gravel and other cars,	7,382 25	
123. Total for maintenance of motive power and cars, .		\$140,261 57
124. Number of engines,	46	
125. Number of passenger cars,	80	
126. Number of baggage cars,	24	
127. Number of merchandise cars,	1,021	
128. Number of gravel cars, [hand and other cars,] .	162	

MISCELLANEOUS.*

129. For fuel used by engines during the year, [last ten months,] viz.:—		
1. Wood, number of cords, 8,237. Cost of the same,	\$49,788 31	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 11,841. Cost of same,	90,985 17	
130. For oil used by cars and engines,	12,797 53	
131. For waste and other material for cleaning, . . .	3,031 13	
132. For salaries, wages and incidental expenses, chargeable to passenger department,	130,847 86	
133. For salaries, wages and incidental expenses, chargeable to freight department,	107,764 27	
134. For gratuities and damages,	5,020 48	
135. For taxes and insurance,	64,316 96	
136. For ferries,	Nothing.	
137. For repairs of station buildings, aqueducts, fixtures, furniture,	107,327 90	
138. For renewals of iron, including laying down, .	Amount below.	
139. For new iron laid down, deducting the value of old iron taken up,	72,862 51	
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	Nothing.	

* See note on preceding page.

141. For amount paid other companies, as rent for use of their roads, specifying each company, . . .	\$6,250—Danvers R. R.
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	36,578 09
143. Total miscellaneous,	\$688,470 21
144. Total expenditures for working the road, . . .	1,052,107 92
145. Total amount of interest paid during the year, [last ten months,]	22,645 26
INCOME DURING THE YEAR.* [LAST TEN MONTHS.]	
146. For Passengers:—	
1. On main road, including branches owned by Company,	\$725,181 81
2. To and from other roads, specifying what,†	215,536 97
147. For Freight:—	
1. On main road and branches owned by Company,	390,482 95
2. To and from other connecting roads, . . .	184,707 95
148. U. S. mails,	12,194 59
149. Rents, [\$29,352.81; interest, \$6,251.96,] . . .	35,604 27
150. Total income,	\$1,563,658 54
151. Net earnings, after deducting expenses, . . .	511,550 62
[Less amount for contingent liabilities, including that to P. S. & P. R. R.,]	60,000 00
DIVIDENDS.	
[Amount earned toward dividend to be paid Jan. 1, 1871, \$209,390 66]	\$451,550 62
152. 5 per cent. Total, [and taxes, . . . 239,601 60]	} \$448,992 26
153. Surplus not divided,	
154. Surplus last year,	\$2,558 36
155. Total surplus; cash and loans, \$16,625.98; stocks and bonds, \$258,464.48; [cost of road more than capital stock paid in, \$700,720.86;] real estate,; fuel, \$27,167.45, . . .	1,000,420 41
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ.:—	
156. Of road and bridges,	} Nothing.
157. Buildings,	
158. Engines and cars,	
MORTGAGE DEBTS.	
159. Amount of debts secured by mortgage, of road and franchise or any property of the Corporation, per last report,	} None.
160. Mortgage debt paid since last report,	
161. Increase of mortgage debt since last report, . . .	
162. Present amount of mortgage debts,	
163. Number of mortgages, on road and franchise or any property of the Corporation,	

NOTE.—Included in the foregoing are the earnings and expenses, miles run, and passengers and freight carried on the Danvers R. R. and Newburyport R. R., which

† Boston, Concord and Montreal; Salem and Lowell; Concord; Concord and Claremont; Contoocook River; Dover and Winnipiseogee; Manchester and Lawrence; Manchester and North Weare; Maine Central; Northern; Portland, Saco and Portsmouth; Portland and Kennebeck; Portsmouth, Great Falls and Conway; Stoneham Street.

have been, by authority of law, leased to this corporation. The rent for the use of the Newburyport R. R. has been prepaid for one hundred years, by a loan to it for that term of time, not on interest. The Dover and Winnipiseogee R. R., located in the State of New Hampshire, is operated by this corporation, under a business contract, and this Report contains the earnings, expenses, miles run, &c., &c., of that road.

ACCIDENTS.

December 2, 1869.—Lewis Lane stepped between two cars at Lawrence, while the Lowell and Lawrence Railroad men were shifting their cars, and was so much injured by the cars coming together, that he died the following day.

December 6.—Man by name of Gaffney, while walking on the track at Wakefield, was struck by the 5.15 P. M. train from Boston, and afterwards died.

December 7.—Abraham North, sixty years of age, while walking on the track at Danvers Centre in a snow-storm, was struck by the plough of an engine and instantly killed.

December 11.—Charles A. Blood, twelve years of age, was riding in the baggage car, between Somerville and Prison Point, the door of the car coming in contact with a gravel train, threw him out, and so much injured him that he died the same day.

December 14.—William Adams, brakeman of Great Falls freight train, fell from the train at South Newmarket and was instantly killed.

December 29.—Lamson Higly, intoxicated, while lying on the track at Dover, was run over by train and instantly killed.

December 30.—A child three years old, named Lawrence Keeron, while on the track north of Melrose station, was run over by 3.30 P. M. train from Boston and instantly killed.

February 12, 1870.—Charles Atherton, an employé, while sawing wood at Exeter station, was instantly killed.

February 17.—Leroy Young, in attempting to get on the 8.35 A. M. train inward from Medford at Ship Street, while the cars were in motion, fell, and had his foot run over by the wheels of the train. He was sent to the Massachusetts General Hospital, recovered, and was sent to his home in Maine.

April 14.—Mrs. Joseph Doran and Anne Dolan, while walking on the track on Mystic River bridge at draw, were run over by the 7.15 P. M. train from Boston. Mrs. Doran had her leg cut off and was thrown into the river and drowned, and afterwards found. Miss Dolan had her leg cut off, and was carried to the Massachusetts General Hospital and died the following day.

April 23.—Charles Loud, boy, while attempting to pass before the engine of the 12 M. outward train at Malden station, was struck by the locomotive and instantly killed.

April 29.—Mrs. C. A. Richards, in attempting to get on the train at Georgetown while it was in motion, fell between the cars and platform and was seriously bruised.

May 27.—Elgin Woodlin of Andover, employed on Great Falls freight train, struck his head against a target on Great Falls Branch, and was so seriously injured that he died May 30th.

June 8.—Peter W. Yarmount, while walking on the track at Plaistow, was run over by train and killed.

June 25.—John H. Wilkinson, in attempting to get on the 6.30 P. M. train for Medford at Prison Point, fell, and the wheels passed over his leg. Was taken to the hospital and died.

June 30.—A lady by name of Hersom, in crossing the track at Boston station, fell, and fractured one of her limbs.

July 5.—Jerome Perham, while crossing the track at Greenwood, was run over by 8.15 P. M. train, had his legs cut off, and afterwards died.

July 13.—Woman by name of Austrich, while walking on the track between Malden and Melrose, was struck by train and so much injured that she afterwards died.

July 18.—Man by name of Dolan, intoxicated, while laying on the track at Haverhill, was run over by inward Portland freight train and instantly killed.

July 23.—Man by name of James Marshes threw himself under a moving train in Boston station, and was so much injured that he died the same day at Massachusetts General Hospital. Supposed to be a case of suicide.

August 1.—Joseph Kidder, of Medford, in shifting freight cars in Boston freight yard, fell between the cars, was run over by them and killed.

August 2.—Margaret Carey was run over at Haverhill bridge by 6.20 P. M. train and instantly killed.

August 31.—Edward Hampton, while walking on Charles River bridge, was struck by an engine and instantly killed.

September 2.—John Galligan, while lying on the track at Edgeworth, was run over by Great Falls freight train and instantly killed.

FRANCIS COGSWELL,
PETER T. HOMER,
N. G. WHITE,
GEORGE C. LORD,
JOHN E. BICKFORD,

Directors of the Boston and Maine Railroad Corporation.

SUFFOLK ss. November 1, 1870. Then personally appeared Francis Cogswell, Peter T. Homer, N. G. White, George C. Lord and John E. Bickford, and severally made oath to the truth of the foregoing statement by them subscribed, according to their best knowledge and belief.

Before

C. P. JUDD, *Justice of the Peace.*

Boston, November 2, 1870. The undersigned have examined the foregoing report of the Directors of the Boston and Maine Railroad, and approve the same.

WILLIAM STEVENS,

Commissioner for Massachusetts.

SAMUEL A. HALEY,

Commissioner for New Hampshire.

REPORT

OF THE

BOSTON AND PROVIDENCE RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	\$4,000,000 00
2. Number of shares of capital stock issued,	37,000 shares.
3. Increase of capital since last report,	\$340,000 00
4. Capital paid in, per last report,	3,360,000 00
5. Capital paid in since last report,	340,000 00
6. Total amount of capital stock paid in,	3,700,000 00
7. Amount realized in cash value for stock issued,	3,700,000 00
8. Funded debt, per last report,	} This corporation has debt.
9. Funded debt paid since last report,	
10. Funded debt, increase of, since last report,	
11. Total present amount of funded debt,	
12. Floating debt, per last report,	
13. Floating debt paid since last report,	
14. Floating debt, increase of, since last report,	
15. Total present amount of floating debt,	
16. Total present amount of funded and floating debt,	
17. Whole amount in cash value realized from funded and floating debts,	
18. Whole amount in cash value realized from stock and debts,	
19. Average rate of interest per annum paid during the year,	
20. Maximum amount of debts during the year,	
COST OF ROAD AND EQUIPMENT.	
[For sundry construction accounts (including expenditures for "third track,")]	
21. For graduation and masonry, per last report,	\$933,690 50
22. For graduation and masonry paid during the past year,	775,000 00
23. Total am't expended for graduation and masonry,	-
24. For wooden bridges, per last report,	\$775,000 00
25. For wooden bridges, paid during the past year,	101,000 00
26. Total amount expended for wooden bridges,	-
27. Total amount expended for iron bridges (if any,)	101,000 00
28. For superstructure, including iron, per last report,	9,840 00
29. For superstructure, including iron, paid during the past year,	378,914 40
30. Total amount expended for superstructure, including iron,	-
31. For stations, buildings and fixtures, per last report,	-
	378,914 40
	497,000 00

32. For stations, buildings and fixtures paid during the past year,	\$201,060 38	
33. Total amount expended for stations, buildings and fixtures,		\$698,060 38
34. For land, land-damages and fences, per last report,	501,094 72	
35. For land, land-damages and fences, paid during the past year,	-	-
36. Total amount expended for land, land-damages and fences,		501,094 72
37. For locomotives, per last report,	105,300 00	
38. For locomotives, paid during the past year,	-	-
39. Total amount expended for locomotives,		105,300 00
40. For passenger and baggage cars, per last report,	44,100 00	
41. For passenger and baggage cars, paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,		44,100 00
43. For merchandise cars, per last report,	58,000 00	
44. For merchandise cars, paid during the past year,	-	-
45. Total amount expended for merchandise cars,		58,000 00
46. For engineering, per last report,	95,000 00	
47. For engineering, paid during the past year,	-	-
48. Total amount expended for engineering,		95,000 00
49. For agencies and other expenses, per last report,	-	-
50. For agencies and other expenses, paid during the past year,	-	-
51. Total amount expended for agencies and other expenses,		-
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,		3,700,000 00
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans,; stocks and bonds,; real estate,; fuel,	504,422 06	
55. Income expended in construction and equipment,	30,168 97	
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	40½ miles.	
57. Length of main road in other States, (specifying how much in each,)	11 miles in Rhode Island.	
58. Length of single main track,	-	
59. Length of double main track,	44 miles.	
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	7½ miles, single, in Mass.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	11 miles.	
62. Length of roads belonging to other companies operated by this Company,	4 miles.	
63. Total miles of road operated by this Company,	63 miles.	
64. Weight of rail, per yard, in main road,	From 56 to 60 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	From 50 to 60 lbs.	
66. Maximum grade, with its length, in main road,	34½ ft. per mile; 26,700 ft.	
67. Maximum grade, with its length, in branch roads,	52.27 ft. per mile; 1,509 ft.	
68. Total rise and fall in main road,	501.40 ft	
69. Total rise and fall in branch roads,	306.87 ft.	
70. Shortest radius of curvature, with length of curve, in main road,	1,900 ft.; 700 ft.	

71. Shortest radius of curvature, with length of curve, in branch roads,	900 ft.	
72. Total degrees of curvature in main road,	842° 12'	
73. Total degrees of curvature in branch roads,	416° 14'	
74. Total length of straight line in main road,	35½ miles.	
75. Total length of straight line in branches,	8.37 miles.	
76. Aggregate length of wooden truss bridges,	2,862½ feet.	
77. Aggregate length of all other wooden bridges,	1,520 feet.	
78. Aggregate length of iron bridges,	299 feet.	
79. Whole length of road unfenced on both sides,	4 miles.	
80. Number of public ways crossed at grade,	42	
81. Number of railroads crossed at grade,	1	
82. Remarks,	—	—
83. Way stations for express trains,	3	
84. Way stations for accommodation trains,	31	
85. Flag stations,	—	—
86. Whole number of way stations,	31	
87. Whole number of flag stations,	—	—

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains,	279,260 miles.
89. Miles run by freight trains,	157,971 miles.
90. Miles run by other trains,	17,622 miles.
91. Total miles run,	454,853 miles.
92. Number of passengers carried in the cars,	1,768,445 pass.
93. Number of passengers carried one mile,	22,606,449 pass.
94. Number of tons of merchandise carried in the cars,	385,467 tons.
95. Number of tons of merchandise carried one mile,	12,499,876 tons.
96. Number of passengers carried one mile, to and from other roads,	6,716,404 pass.
97. Number of tons carried one mile, to and from other roads,	7,965,367 tons.
98. Rate of speed adopted for express passenger trains, including stops,	29 miles per hour.
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	29 miles per hour.
100. Rate of speed adopted for accommodation trains,	22 miles per hour.
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	22 miles per hour.
102. Average rate of speed actually attained by special trains, including stops and detentions,	22 miles per hour.
103. Average rate of speed adopted for freight trains, including stops,	12 miles per hour.
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile,	11,303,225 tons.
105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile,	18,749,814 tons.

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$74,274 37
107. For repairs of wooden bridges, [wood and iron,]	7,605 28

* All items under the headings marked with an asterisk are required by law for "the total miles of road operated by this company."

108. For wages of switchmen, average per month,	\$44 30	} Total,	\$21,668 15
109. For wages of gate-keepers, average per month,	37 36		
110. For wages of signal-men, average per month,	28 16		
111. For wages of watchmen, average per month,	48 45		
112. Number of men employed, exclusive of those engaged in construction,	580		
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)			1,632 93
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,			1,726 19
115. Total for maintenance of way,			\$106,906 92
MOTIVE POWER AND CARS.			
116. For repairs of locomotives,			\$29,668 68
117. For new locomotives, to cover depreciation,			24,000 00
118. For repairs of passenger cars,			27,050 79
119. For new passenger cars, to cover depreciation,			14,100 00
120. For repairs of merchandise cars,			11,011 01
121. For new merchandise cars, to cover depreciation,			20,000 00
122. For repairs of gravel and other cars,			-
123. Total for maintenance of motive power and cars,			\$125,830 48
124. Number of engines,	32		
125. Number of passenger cars,	51		
126. Number of baggage cars,	12		
127. Number of merchandise cars,	306		
128. Number of gravel cars,	158		
MISCELLANEOUS.*			
[For water,]			\$1,637 12
129. For fuel used by engines during the year, viz.:—			
1. Wood, No. of cords, 1,250. Cost of the same,			6,777 00
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 8,360. Cost of same,			62,718 40
130. For oil used by cars and engines,			8,552 04
131. For waste and other material for cleaning,			4,223 43
132. For salaries, wages and incidental expenses, chargeable to passenger department,			88,323 41
133. For salaries, wages and incidental expenses, chargeable to freight department,			105,657 39
134. For gratuities and damages,			8,713 28
135. For taxes and insurance, [including Gov't and State taxes,]			98,412 98
136. For ferries,			-
137. For repairs of station buildings, aqueducts, fixtures, furniture,			69,106 87
138. For renewals of iron, including laying down,		}	63,176 04
139. For new iron laid down, deducting the value of old iron taken up,			
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,			-
141. For amount paid other companies, as rent for use of their roads, specifying each company,			-

* See note on preceding page.

142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	\$19,586 78	
143. Total miscellaneous,		\$536,884 24
144. Total expenditures for working the road,	769,621 64	} 770,818 19
145. Total amount of interest paid during the year,	696 55	

INCOME DURING THE YEAR.*

146. For <i>Passengers</i> :—		
1. On main road including branches owned by company,	\$413,933 74	
2. To and from other roads, specifying what,	162,490 54	
147. For <i>Freight</i> :		
1. On main road and branches owned by company,	197,831 26	
2. To and from other connecting roads,	233,359 50	
148. U. S. mails, [\$4,207.50; express, \$19,523.39; interest, &c., \$4,881.90,]	28,612 79	
149. Rents, [\$11,697.73; dividends, \$1,200,]	12,897 78	
150. Total income,		\$1,049 125 56
151. Net earnings, after deducting expenses, [and interest,]	278,807 37	

DIVIDENDS.

152. 5 per cent. Total, [in July, 1870,]		\$185,000 00
153. Surplus not divided, [for ten months,]	\$93,807 37	
154. Surplus last year, [balance of income account,]	410,614 69	
155. Total surplus; cash and loans,		
stocks and bonds,		
; real estate,		
fuel,		504,422 06

ESTIMATED DEPRECIATION BEYOND THE RENEWALS,
VIZ. :—

156. Of road and bridges,	} Nothing.
157. Buildings,	
158. Engines and cars,	

MORTGAGE DEBTS.

159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last Report,	} Nothing.
160. Mortgage debt paid since last report,	
161. Increase of mortgage debt since last report,	
162. Present amount of mortgage debts,	
163. Number of mortgages, on road and franchise or any property of the Corporation,	

ACCIDENTS.

December 7, 1869.—Jeremiah Shay, walking on track at Attleborough, was fatally injured by 4 P. M. train from Boston.

April 7, 1870.—Patrick Cullinson, walking on track near Northampton Street, Boston, was struck and fatally injured by inward express train from New Bedford, about 9.15, A. M., April 6, 1870.

April 30.—Annie Applebee, standing on track near the culvert at East Junction, killed by boat train from Boston.

May 4.—James Curran, intoxicated, struck by a locomotive while lying on track. Taken to City Hospital.

July 28.—Michael Moran, walking on track near Hyde Park, killed by 9 P. M. train from Boston.

August 8.—Margaret Murphy, walking on track beyond Hyde Park station, was instantly killed by steamboat train from Boston.

September 5.—James Foley, asleep on track in Roxbury, near Tremont Street, run over by train at 4, A. M., and fatally injured.

JOHN H. CLIFFORD,
SAM'L T. DANA,
F. M. WELD,
J. HUNTINGTON WOLCOTT,

Directors of the Boston and Providence Railroad Corporation.

BOSTON, SUFFOLK, ss. November 2, 1870. Then personally appeared John H. Clifford, Sam'l T. Dana, F. M. Weld and J. Huntington Wolcott, and severally made oath to the truth of the foregoing statement by them subscribed.

Before me,

A. A. FOLSOM, *Justice of the Peace.*

.

REPORT

OF THE

CAPE COD RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,* [15,000 shares], . . .	-	-
2. Number of shares of capital stock issued, . . .	12,466 shares.	
3. Increase of capital since last report, . . .	1,133 shares.	
4. Capital paid in, per last report, . . .	\$801,905 94	
5. Capital paid in since last report, [account extension to Wellfleet,] . . .	118,671 50	
6. Total amount of capital stock paid in, . . .		\$915,577 44
7. Amount realized in cash value for stock issued, . . .	-	-
8. Funded debt, per last report, . . .	125,000 00	
9. Funded debt paid since last report, . . .	-	-
10. Funded debt, increase of, since last report, . . .	-	-
11. Total present amount of funded debt, . . .		125,000 00
12. Floating debt, per last report, [notes payable,] . . .	78,489 08	
13. Floating debt paid since last report, . . .	27,064 58	
14. Floating debt, increase of, since last report, . . .	-	-
15. Total present amount of floating debt, . . .		51,424 50
16. Total present amount of funded and floating debt, . . .		176,424 50
17. Whole amount in cash value realized from funded and floating debts, . . .	176,424 50	
18. Whole amount in cash value realized from stock and debts, . . .	1,092,001 94	
19. Average rate of interest per annum, paid during the year, . . .	Seven per cent.	
20. Maximum amount of debts during the year, . . .	208,489 08	
COST OF ROAD AND EQUIPMENT.		
[For Cape Cod Central R. R. and its equipment,]		\$369,708 19
[For paid account construction, Orleans to Wellfleet, unfinished,] . . .		58,445 93
21. For graduation and masonry per last report, . . .	\$207,921 30	
22. For graduation and masonry paid during the past year, . . .	-	-
23. Total amount expended for graduation and masonry, . . .		207,921 30
24. For wooden bridges, per last report, . . .	30,305 54	
25. For wooden bridges paid during the past year, . . .	-	-
26. Total amount expended for wooden bridges, . . .		30,305 54
27. Total amount expended for iron bridges, (if any,) . . .	-	-
28. For superstructure, including iron, per last report, . . .	433,120 99	
29. For superstructure, including iron, paid during the past year, . . .	-	-

* Per value of stock reduced by Act of Legislature, in 1851, from \$100 to \$60 per share, and construction account was reduced proportionately.

30. Total amount expended for superstructure, including iron,		\$433,120 99
31. For stations, buildings and fixtures, per last report,	\$91,289 83	
32. For stations, buildings and fixtures, paid during the past year,	-	-
33. Total amount expended for stations, buildings and fixtures,		91,289 83
34. For land, land-damages and fences, per last report,	76,823 96	
35. For land, land-damages and fences, paid during the past year,	-	-
36. Total amount expended for land, land-damages, and fences,		76,823. 96
37. For locomotives, per last report,	54,545 96	
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,		54,545 96
40. For passenger and baggage cars, per last report,	31,083 73	
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,		31,083 73
43. For merchandise cars, per last report,	38,235 04	
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,		38,235 04
46. For engineering, per last report,	21,054 95	
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		21,054 95
49. For agencies and other expenses, per last report,	47,243 85	
50. For agencies and other expenses, paid during the past year,	-	-
51. Total amount expended for agencies and other expenses,		47,243 85
52. Amounts of discounts or other sacrifices on stock and bonds issued,	} 97,344 50	
[Discount bonds, \$22,344.50 ; stock, 1,500 shares, sold in 1850 at \$50=\$75,000,		
53. Total cost of road and equipment,		1,454,779 27
54. Amount of assets or property held by the corporation in addition to the cost of the road ; cash and loans, \$64,078.20 ; stocks and bonds, ; real estate, \$8,220.35 ; fuel, \$2,419.50 ; [stock in machine shop, &c., \$31,628.62,]	106,346 67	
55. Income expended in construction and equipment, [about,]	350,000 00	
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	64.810 miles.	
57. Length of main road in other States, (specifying how much in each,)	-	-
58. Length of single main track,	64 81-100 miles.	
59. Length of double main track,	-	-
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	Single, 1 4-100 miles.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	3 miles.	
62. Length of roads belonging to other companies operated by this Company,	-	-
63. Total miles of road operated by this Company,	64 81-100 miles.	
64. Weight of rail, per yard, in main road,	{ 56 lbs. for 50 miles ; 45 lbs. for 18 4-10 miles.	

65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	56 lbs.	
66. Maximum grade, with its length, in main road,	68 6-10 feet for 1½ miles.	
67. Maximum grade, with its length, in branch roads,	40 feet for short distance.	
68. Total rise and fall in main road,	1,479.10 feet.	
69. Total rise and fall in branch roads,	22 feet.	
70. Shortest radius of curvature, with length of curve, in main road,	1,432 ft. for 4,800 ft.	
71. Shortest radius of curvature, with length of curve, in branch roads,	300 ft. for short distance.	
72. Total degrees of curvature in main road,	1,911° 56' 44''	
73. Total degrees of curvature in branch roads,	233°	
74. Total length of straight line in main road,	43 38-100	
75. Total length of straight line in branches,	21-100 miles.	
76. Aggregate length of wooden truss bridges,	179 feet.	
77. Aggregate length of all other wooden bridges,	659 feet.	
78. Aggregate length of iron bridges,	-	-
79. Whole length of road unfenced on both sides,	11 miles.	
80. Number of public ways crossed at grade,	80	
81. Number of railroads crossed at grade,	-	-
82. Remarks,	-	-
83. Way stations for express trains,	-	-
84. Way stations for accommodation trains,	20	
85. Flag stations,	5	
86. Whole number of way stations,	20	
87. Whole number of flag stations,	5	
DOINGS DURING THE YEAR.*		
88. Miles run by passenger trains,	81,368	
89. Miles run by freight trains,	24,012	
90. Miles run by other trains,	8,770	
91. Total miles run,		114,150
92. Number of passengers carried in the cars,	190,409	
93. Number of passengers carried one mile,	4,361,482	
94. Number of tons of merchandise carried in the cars,	46,333	
95. Number of tons of merchandise carried one mile,	1,159,260	
96. Number of passengers carried one mile to and from other roads,	3,448,498	
97. Number of tons carried one mile to and from other roads,	738,060	
98. Rate of speed adopted for express passenger trains, including stops,	-	-
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	-	-
100. Rate of speed adopted for accommodation trains,	22 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	22 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	-	-
103. Average rate of speed adopted for freight trains, including stops,	13 miles per hour.	
104. Estimated weight, in tons, of passenger cars (not including passengers) hauled one mile,	-	-
105. Estimated weight, in tons, of merchandise cars, (not including freight) hauled one mile,	-	-

* All items under the headings marked with an asterisk, are required by law for " the total miles of road operated by this company."

EXPENDITURES FOR WORKING THE ROAD.*		
106. For repairs of road, maintenance of way, exclusive of wooden bridges and renewals of iron, .	\$23,367 21	
107. For repairs of wooden bridges,	-	
108. For wages of switchmen, average per month, \$45 00	Total,	3,800 00
109. For wages of gate-keepers, average per month,		
110. For wages of signal-men, average per month,		
111. For wages of watchmen, average per month, 52 00		
112. Number of men employed, exclusive of those engaged in construction,	-	-
113. For removing ice and snow (this item to include all labor, tools, repairs, and extra steam-power used,)	-	-
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses, .	595 38	
115. Total for maintenance of way,		\$27,762 59
MOTIVE POWER AND CARS.		
116. For repairs of locomotives,	\$23,298 66	
117. For new locomotives, to cover depreciation, .	-	-
118. For repairs of passenger cars,	12,948 01	
119. For new passenger cars, to cover depreciation, .	-	-
120. For repairs of merchandise cars,	14,523 27	
121. For new merchandise cars, to cover depreciation, .	-	-
122. For repairs of gravel and other cars,	-	-
123. Total for maintenance of motive power and cars, .		\$50,769 94
124. Number of engines,	8	
125. Number of passenger cars,	15	
126. Number of baggage cars,	7	
127. Number of merchandise cars,	78	
128. Number of gravel cars,	61	
MISCELLANEOUS.*		
129. For fuel used by engines during the year, viz. :—		
1. Wood, No. of cords, 550. Cost of the same,	\$3,800 00	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 1,800. Cost of same,	12,600 00	
130. For oil used by cars and engines,	1,515 15	
131. For waste and other material for cleaning, . .	434 56	
132. For salaries, wages and incidental expenses, chargeable to passenger department,	15,107 76	
133. For salaries, wages and incidental expenses, chargeable to freight department,	7,558 87	
134. For gratuities and damages,	1,770 99	
135. For taxes and insurance,	2,040 95	
136. For ferries,	-	-
137. For repairs of station buildings, aqueducts, fixtures, furniture, [and wharf,]	7,004 11	
138. For renewals of iron, [and sleepers,] including laying down, [included in road repairs,]	11,976 22	
139. For new iron laid down, deducting the value of old iron taken up,	-	-
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	-	-

* See note on preceding page.

141. For amount paid other companies as rent for use of their roads, specifying each company, . . .	-	-
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, [and \$2,500 paid for mail side service,] and all other expenses not included in any of the foregoing items,	\$9,076 48	
143. Total miscellaneous,		\$72,380 09
144. Total expenditures for working the road, . . .		150,912 62
145. Total amount of interest paid during the year, . . .		11,513 68
INCOME DURING THE YEAR.*		
146. <i>For Passengers</i> :—		
1. On main road, including branches owned by company,	\$30,778 08	
2. To and from other roads, specifying what, [O. Col. & Newport, Fairhaven, and M. & Taunton,]	122,441 32	
147. <i>For Freight</i> :—		
1. On main road and branches owned by company,	17,216 82	
2. To and from other connecting roads, . . .	34,180 43	
148. U. S. mails,	8,083 33	
149. Rents,	223 66	
150. Total income,		\$212,923 63
151. Net earnings, after deducting expenses, . . .	62,011 01	
DIVIDENDS.		
152. 5 per cent. Total,	\$33,999 00	
153. Surplus not divided,	16,498 43	
154. Surplus last year, [applied towards payment of debt,]	26,065 50	
155. Total surplus, cash and loans, ; stocks and bonds, ; real estate, ; fuel, . . .	-	-
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—		
156. Of road and bridges,	-	-
157. Buildings,	-	-
158. Engines and cars,	-	-
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last Report,	-	-
160. Mortgage debt paid since last Report, . . .	-	-
161. Increase of mortgage debt since last Report, . . .	-	-
162. Present amount of mortgage debts,	-	-
163. Number of mortgages on road and franchise, or any property of the Corporation,	-	-

M. S. LINCOLN,
JEFFERSON BORDEN,
MATTHEW STARBUCK,
E. N. WINSLOW,

Majority of Directors of the Cape Cod Railroad Corporation.

SUFFOLK, ss. November 10, 1870. Then personally appeared Minor S. Lincoln, Jefferson Borden, Matthew Starbuck and E. N. Winslow, and severally made oath to the truth of the foregoing statement by them subscribed.

Before GEO. MARSTON, *Justice of the Peace for all the Counties.*

R E P O R T

OF THE

CHESHIRE RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized, [as heretofore reported, 22,500 shares,]		\$2,250,000 00
2. Number of shares of capital stock issued, [21,000 preferred; 533 unpreferred,]	21,533	
3. Increase of capital since last report,	None.	
4. Capital paid in, per last report,	\$2,085,925 00	
5. Capital paid in since last report,	None.	
6. Total amount of capital stock paid in,		2,085,925 00
7. Amount realized in cash value for stock issued,	2,085,925 00	
8. Funded debt, per last report,	791,500 00	
9. Funded debt paid since last report,	1,500 00	
10. Funded debt, increase of, since last report,	17,000 00	
11. Total present amount of funded debt,		807,000 00
12. Floating debt, per last report,	None.	
13. Floating debt paid since last report,	None.	
14. Floating debt, increase of, since last report,	None.	
15. Total present amount of floating debt,	None.	
16. Total present amount of funded and floating debt,		807,000 00
17. Whole amount in cash value realized from funded and floating debts,	603,882 06	
18. Whole amount in cash value realized from stock and debts,	2,689,807 06	
19. Average rate of interest per annum paid during the year,	6 per cent.	
20. Maximum amount of debts during the year,	807,000 00	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$1,490,749 84	
22. For graduation and masonry paid during the past year,	None.	
23. Total am't expended for graduation and masonry,		\$1,490,749 84
24. For wooden bridges, per last report,	41,490 38	
25. For wooden bridges paid during the past year,	None.	
26. Total amount expended for wooden bridges,		41,490 38
27. Total amount expended for iron bridges, (if any,)	None.	
28. For superstructure, including iron, per last report,	480,371 86	
29. For superstructure, including iron, paid during the past year,	None.	
30. Total amount expended for superstructure, including iron,		480,371 86
31. For stations, buildings and fixtures, per last report,	106,333 52	
32. For stations, buildings and fixtures paid during the past year,	None.	

33. Total amount expended for stations, buildings and fixtures,		\$106,333 52
34. For land, land-damages and fences, per last report,	\$128,379 40	
35. For land, land-damages and fences paid during the past year,	None.	
36. Total amount expended for land, land-damages and fences,		128,379 40
37. For locomotives, per last report,	138,469 39	
38. For locomotives paid during the past year,	None.	
39. Total amount expended for locomotives,		138,469 39
40. For passenger and baggage cars, per last report,	24,971 86	
41. For passenger and baggage cars paid during the past year,	None.	
42. Total amount expended for passenger and baggage cars,		24,971 86
43. For merchandise cars, per last report,	158,825 07	
44. For merchandise cars paid during the past year,	None.	
45. Total amount expended for merchandise cars,		158,825 07
46. For engineering, per last report,	46,889 63	
47. For engineering paid during the past year,	None.	
48. Total amount expended for engineering,		46,889 63
49. For agencies and other expenses, per last report,	72,826 11	
50. For agencies and other expenses paid during the past year,	None.	
51. Total amount expended for agencies and other expenses,		72,826 11
52. Amounts of discounts or other sacrifices on stock and bonds issued,	88,117 94	
53. Total cost of road and equipment,		2,689,307 06
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, \$58,825.22; stocks and bonds, \$149,000; real estate, \$25,000; fuel, [and other materials,] \$139,664.71,	372,489 93	
55. Income expended in construction and equipment, [for the past year,]	47,000 00	

CHARACTERISTICS OF ROAD.

56. Length of main road in this State,	10 731-1,000 miles.
57. Length of main road in other States, (specifying how much in each,) [N. H.,]	42 915-1,000 miles.
58. Length of single main track,	53 616-1,000 miles.
59. Length of double main track,	None.
60. Length of branches owned by the Company, stating whether they have a single or double track, and specifying length in this State, and in each other State,)	None.
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	13 miles.
62. Length of roads belonging to other companies operated by this Company,	—
63. Total miles of road operated by this Company,	53 646-1,000 miles.
64. Weight of rail, per yard, in main road,	60 lbs.
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	None.
66. Maximum grade, with its length, in main road,	59 664-1,000 ft.; 14 8-10 m.
67. Maximum grade, with its length, in branch roads,	None.
68. Total rise and fall in main road,	2,377 feet.
69. Total rise and fall in branch roads,	None.
70. Shortest radius of curvature, with length of curve, in main road,	955 feet; 70 feet long.

71. Shortest radius of curvature, with length of curve, in branch roads,	None.
72. Total degrees of curvature in main road,	8,152' 18"
73. Total degrees of curvature in branch roads,	None.
74. Total length of straight line in main road,	81 28-100 miles.
75. Total length of straight line in branches,	None.
76. Aggregate length of wooden truss bridges,	1,534 feet.
77. Aggregate length of all other wooden bridges,	425 feet.
78. Aggregate length of iron bridges,	None.
79. Whole length of road unfenced on both sides,	All fenced.
80. Number of public ways crossed at grade,	37
81. Number of railroads crossed at grade,	None.
82. Remarks,	None.
83. Way stations for express trains,	4
84. Way stations for accommodation trains,	11
85. Flag stations,	4
86. Whole number of way stations,	15
87. Whole number of flag stations,	4

DOINGS DURING THE YEAR.*

88 Miles run by passenger trains,	84,925	
89. Miles run by freight trains,	368,852	
90. Miles run by other trains,	14,511	
91. Total miles run,		468,288
92. Number of passengers carried in the cars,	110,020	
93. Number of passengers carried one mile,	3,844,808	
94. Number of tons of merchandise carried in the cars,	276,081*	
95. Number of tons of merchandise carried one mile,	15,070,527	
96. Number of passengers carried one mile, to and from other roads	2,953,165	
97. Number of tons carried one mile, to and from other roads,	14,501,947	
98. Rate of speed adopted for express passenger trains, including stops,	25 miles per hour.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	25 miles per hour.	
100. Rate of speed adopted for accommodation trains,	22 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	22 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	-	-
103. Average rate of speed adopted for freight trains, including stops,	10 miles per hour.	
104. Estimated weight, in tons, of passenger cars (not including passengers) hauled one mile,	3,397,000	
105. Estimated weight, in tons, of merchandise cars, (not including freight) hauled one mile,	22,606,000	

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$49,010 10
107. For repairs of wooden bridges,	2,405 38

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

108. For wages of switchmen, average per month,	\$50 00	} Total,	\$1,862 65	
109. For wages of gate-keepers, average per month,	None.			\$5,025 84
110. For wages of signal-men, average per month,	None.			
111. For wages of watchmen, average per month,	55 00		3,163 19	
112. Number of men employed, exclusive of those engaged in construction,			416	
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)			1,425 22	
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,			938 37	
115. Total for maintenance of way,				58,804 91

MOTIVE POWER AND CARS.

116. For repairs of locomotives,		\$47,882 28	
117. For new locomotives, to cover depreciation, [additional,]		12,000 00	
118. For repairs of passenger cars,		23,745 72	
119. For new passenger cars, to cover depreciation, [additional,]		10,000 00	
120. For repairs of merchandise cars,		20,951 57	
121. For new merchandise cars, to cover depreciation, [additional,]		25,000 00	
122. For repairs of gravel and other cars, [new cars,]		1,756 00	
123. Total for maintenance of motive power and cars,			\$141,335 57
124. Number of engines,	25		
125. Number of passenger cars,	20		
126. Number of baggage cars,	7		
127. Number of merchandise cars,	893		
128. Number of gravel cars,	10		
[Postal cars,]	2		

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz. :—		
1. Wood, number of cords, 15,480. Cost of the same,		\$79,607 18
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 732. Cost of same,		6,588 00
130. For oil used by cars and engines,		9,380 56
131. For waste and other material for cleaning,		4,185 29
132. For salaries, wages, and incidental expenses, chargeable to passenger department,		19,749 57
133. For salaries, wages, and incidental expenses, chargeable to freight department,		69,259 42
134. For gratuities and damages,		1,683 38
135. For taxes and insurance,		29,378 25
136. For ferries,		None.
137. For repairs of station buildings, aqueducts, fixtures, furniture,		24,431 70
138. For renewals of iron, including laying down,	}	32,871 91
139. For new iron laid down, deducting the value of old iron taken up,		
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,		None.

* See note on preceding page.

141. For amount paid other companies, as rent for use of their roads, specifying each company, [Vermont and Mass. R. R. Co.,]	\$42,500 00	
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	12,606 58	
143. Total miscellaneous,		\$332,241 84
144. Total expenditures for working the road,		532,382 32
145. Total amount of interest paid during the year,		45,903 14
INCOME DURING THE YEAR.*		
146. For Passengers:—		
1. On main road, including branches owned by company,	\$44,283 69	\$176,548 41
2. To and from other roads, specifying what, [Rut. & Burl., Vt. Central, &c.,]	132,264 72	
147. For Freight:—		
1. On main road, and branches owned by company,	37,535 40	422,167 02
2. To and from other connecting roads,	384,631 62	
148. U. S. mails,	5,625 00	
149. Rents, [express and miscellaneous,]	12,413 99	
150. Total income,		616,754 42
151. Net earnings, after deducting expenses, [and interest,]	38,468 96	
DIVIDENDS.		
152. 2 per cent. Total, [and tax,]	\$44,210 53	
153. Surplus not divided,	None.	
154. Surplus last year,	109,494 98	
155. Total surplus; cash and loans,† ; stocks and bonds,† ; real estate,† ; fuel,†		\$103,754 41
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—		
156. Of road and bridges,	} None.	
157. Buildings,		
158. Engines and cars,		
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage of road and franchise, or any property of the corporation, per last report,	} None.	
160. Mortgage debt paid since last report,		
161. Increase of mortgage debt since last report,		
162. Present amount of mortgage debts,		
163. Number of mortgages on road and franchise, or any property of the corporation,		

ACCIDENTS.

July 14, 1870.—J. O'Donnell, employé at Winchendon, while standing between the cars when the train was switching, was crushed so that he lived but a few hours.

August 24.—Dr. H. B. Day, of Utica, New York, in attempting to get upon the passenger train, at Fitzwilliam, while in motion, was thrown upon the track, run over, and lived but two or three hours.

† Shown in report of Assets.

August 25.—Charles Scott, brakeman, was instantly killed at Fitzwilliam, by falling between the cars and being run over by the train.

August 26.—Mrs. A. T. Wilder, while stepping from the car at Keene, fell between the platform and car, breaking her leg.

E. MURDOCK, JR.,
THOS. M. EDWARDS,
CHARLES W. CARTWRIGHT,
WILLIAM A. BRIGHAM,
SAM'L GOULD,
J. HY. ELLIOT,
ISAAC M. MURDOCK,
Directors of the Cheshire Railroad Corporation.

COMMONWEALTH OF MASSACHUSETTS.

SUFFOLK, ss. November 11, 1870. Then personally appeared E. Murdock, Jr., Charles W. Cartwright, William A. Brigham, Samuel Gould, Isaac M. Murdock, and severally made oath to the truth of the foregoing statement by them subscribed.

Before me,

HENRY G. DENNY, *Justice of the Peace.*

STATE OF NEW HAMPSHIRE.

CHESHIRE, ss. KEENE, November 11, 1870. Then personally appeared Thos. M. Edwards and J. Hy. Elliot, and severally made oath to the truth of the foregoing statement by them subscribed.

Before me,

R. STEWART, *Justice of the Peace.*

R E P O R T

OF THE

CONNECTICUT RIVER RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$2,250,000 00
2. Number of shares of capital stock issued,	17,000	
3. Increase of capital since last report,	None.	
4. Capital paid in, per last report,	\$1,700,000 00	
5. Capital paid in since last report,	None.	
6. Total amount of capital stock paid in,		1,700,000 00
7. Amount realized in cash value for stock issued,	1,703,724 32	
8. Funded debt, per last report,	250,000 00	
9. Funded debt paid since last report,	None.	
10. Funded debt, increase of, since last report,	None.	
11. Total present amount of funded debt,		250,000 00
12. Floating debt, per last report,	None.	
13. Floating debt paid since last report,	-	-
14. Floating debt, increase of, since last report,	70,000 00	
15. Total present amount of floating debt,		70,000 00
16. Total present amount of funded and floating debt,		320,000 00
17. Whole amount in cash value realized from funded and floating debts,	322,000 00	
18. Whole amount in cash value realized from stock and debts,	2,025,724 32	
19. Average rate of interest per annum paid during the year,	About six per cent.	
20. Maximum amount of debts during the year,	352,000 00	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$638,987 19	
22. For graduation and masonry paid during the past year,	16,642 76	
23. Total am't expended for graduation and masonry,		\$655,629 95
24. For wooden bridges, per last report,	42,991 94	
25. For wooden bridges paid during the past year,	-	-
26. Total amount expended for wooden bridges,		42,991 94
27. Total amount expended for iron bridges, (if any,) [per last report,]		5,200 00
28. For superstructure, including iron, per last report,	589,156 01	
29. For superstructure, including iron, paid during the past year,	9,000 00	
30. Total amount expended for superstructure, including iron,		598,156 01
31. For stations, buildings and fixtures, per last report,	130,410 80	
32. For stations, buildings and fixtures paid during the past year,	6,500 00	

33. Total amount expended for stations, buildings and fixtures,		\$136,910 80
34. For land, land-damages and fences, per last report,	\$278,682 24	
35. For land, land-damages and fences paid during the past year,	2,050 00	
36. Total amount expended for land, land-damages, and fences,		280,682 24
37. For locomotives, per last report,	93,665 11	
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,		93,665 11
40. For passenger and baggage cars, per last report,	23,350 34	
41. For passenger and baggage cars paid during the past year,	22,315 00	
42. Total amount expended for passenger and baggage cars,		45,665 34
43. For merchandise cars, per last report,	84,483 44	
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,		84,483 44
46. For engineering, per last report,	-	-
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,	-	-
49. For [engineering,] agencies and other expenses, per last report,	162,045 80	
50. For [engineering,] agencies and other expenses paid during the past year,	-	-
51. Total amount expended for [engineering,] agencies and other expenses,		162,045 80
52. Amounts of discounts or other sacrifices on stock and bonds issued,	Nothing.	
53. Total cost of road and equipment,		2,100,480 13
54. Amount of assets or property held by the corporation in addition to the cost of the road; cash and loans, \$180,425.20; stocks and bonds, [including value of sinking fund,] \$109,411.21; real estate, \$5,178.12; fuel, [and other materials,] \$108,831.84,	403,846 87	
[Less liabilities for dividends, expense bills, &c.,]	164,854 21	
		238,992 16
55. Income expended in construction and equipment,	80,430 13	
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	50 miles.	
57. Length of main road in other States, (specifying how much in each,)	-	-
58. Length of single main track,	46½ miles.	
59. Length of double main track,	3½ miles.	
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	} 3 35-100. All in this State.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,		52,860 feet.
62. Length of roads belonging to other companies operated by this Company,	-	-
63. Total miles of road operated by this Company,	53 35-100 miles.	
64. Weight of rail, per yard, in main road,	{ 13 miles of 50 lbs.; 33 of 66 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)		3 35-100, 60 lbs.
66. Maximum grade, with its length, in main road,	32 ft. per mile for 6½ miles.	
67. Maximum grade, with its length in branch roads,	18 ft per mile for 1½ miles.	
68. Total rise and fall in main road,	680 feet.	

69. Total rise and fall in branch roads,	28 feet.	
70. Shortest radius of curvature, with length of curve, in main road,	882 ft. radius ; 892 ft.	
71. Shortest radius of curvature, with length of curve, in branch roads,	714 ft. radius ; 1,300 ft.	
72. Total degrees of curvature in main road,	1,854°	
73. Total degrees of curvature in branch roads,	448°	
74. Total length of straight line in main road,	36 miles.	
75. Total length of straight line in branches,	1½ miles.	
76. Aggregate length of wooden truss bridges,	2,674 feet.	
77. Aggregate length of all other wooden bridges,	None.	
78. Aggregate length of iron bridges,	80 feet.	
79. Whole length of road unfenced on both sides,	None.	
80. Number of public ways crossed at grade,	54	
81. Number of railroads crossed at grade,	One.	
82. Remarks,	-	-
83. Way stations for express trains,	3	
84. Way stations for accommodation trains,	15	
85. Flag stations,	None.	
86. Whole number of way stations,	15	
87. Whole number of flag stations,	None.	
DOINGS DURING THE YEAR.*		
88. Miles run by passenger trains,	137,068	
89. Miles run by freight trains,	112,195	
90. Miles run by other trains,	13,673	
91. Total miles run,		262,936
92. Number of passengers carried in the cars,	696,628	
93. Number of passengers carried one mile,	7,954,821	
94. Number of tons of merchandise carried in the cars,	253,465	
95. Number of tons of merchandise carried one mile,	6,466,931	
96. Number of passengers carried one mile, to and from other roads,	2,626,193	
97. Number of tons carried one mile, to and from other roads,	5,605,325	
98. Rate of speed adopted for express passenger trains, including stops,	32 miles per hour.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	30 miles per hour.	
100. Rate of speed adopted for accommodation trains,	25 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	22 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	20 miles per hour.	
103. Average rate of speed adopted for freight trains, including stops,	15 miles per hour.	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile,	-	-
105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile,	-	-
EXPENDITURES FOR WORKING THE ROAD.*		
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$70,864 53	
107. For repairs of wooden bridges,	1,483 07	

* All items under the headings marked with an asterisk, are required by law for " the total miles of road operated by this company."

108. For wages of switchmen, average per month,	\$52 00	} Total,	
109. For wages of gate-keepers, average per month,	30 00		
110. For wages of signal-men, average per month,			
111. For wages of watchmen, average per month,	65 00		
112. Number of men employed, exclusive of those engaged in construction,		339	
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)		\$1,851 53	
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,		-	-
115. Total for maintenance of way,			\$74,199 13
MOTIVE POWER AND CARS.			
116. For repairs of locomotives,		\$22,480 19	
117. For new locomotives, to cover depreciation,		-	-
118. For repairs of passenger cars,		12,831 20	
119. For new passenger cars, to cover depreciation,		-	-
120. For repairs of merchandise cars,		19,916 17	
121. For new merchandise cars, to cover depreciation,		-	-
122. For repairs of gravel and other cars,		515 21	
[For repairs of tools and machinery,]		3,588 94	
123. Total for maintenance of motive power and cars,			\$59,331 71
124. Number of engines,	17		
125. Number of passenger cars,	21		
126. Number of baggage cars,	8		
127. Number of merchandise cars,	278		
128. Number of gravel cars,	44		
MISCELLANEOUS.*			
129. For fuel used by engines during the year, viz.:—			
1. Wood, No. of cords, 4,986½. Cost of the same,		\$25,453 32	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 1,832. Cost of same,		11,502 48	
130. For oil used by cars and engines,		4,003 62	
131. For waste and other material for cleaning,		2,340 41	
132. For salaries, wages and incidental expenses, chargeable to passenger department,		32,175 75	
133. For salaries, wages and incidental expenses, chargeable to freight department,		64,218 80	
134. For gratuities and damages,		2,451 00	
135. For taxes and insurance,		47,885 67	
136. For ferries,		-	-
137. For repairs of station buildings, aqueducts, fixtures, furniture,		12,053 85	
138. For renewals of iron, including laying down,		-	-
139. For new iron laid down, deducting the value of old iron taken up,		20,051 51	
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,		-	-
141. For amount paid other companies, as rent for use of their roads, specifying each company,		-	-

* See note on preceding page.

142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	\$19,130 56	
143. Total miscellaneous,		\$241,266 97
144. Total expenditures for working the road,		874,797 81
145. Total amount of interest paid during the year,		19,211 09

INCOME DURING THE YEAR.*

146. For Passengers:—		
1. On main road, including branches owned by company, [and,]	}	\$253,503 36
2. To and from other roads, specifying what,		
147. For Freight:—		
1. On main road and branches owned by Co., [and]	}	296,181 29
2. To and from other connecting roads,		
148. U. S. mails, [\$5,039.24 ; express, \$11,056.63,]		16,095 87
149. Rents, [and other income,]		6,191 80
150. Total income,		\$591,972 32
151. Net earnings, after deducting expenses,		197,174 51

DIVIDENDS.

[Tenth payment to sinking fund,]	\$8,000 00	
152. 10 per cent. Total,		\$170,000 00
153. Surplus not divided,	None.	
154. Surplus last year, [for 12 months,]	7,054 32	
155. Total surplus; cash and loans, [and dues from individuals and corporations,] \$180,425.20 ; stocks and bonds, \$6,099 ; real estate, \$5,178.12 ; fuel, [and other materials,] \$108,831.84 ; [income expended in construction and equipment, \$80,430.13,] [less liabilities, \$164,854.21,]		216,110 08

ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :

156. Of road and bridges,	—	—
157. Buildings,	—	—
158. Engines and cars,	—	—

MORTGAGE DEBTS.

159. Amount of debts secured by mortgage, of road and franchise or any property of the corporation, per last report,	\$250,000 00
160. Mortgage debt paid since last report,	None.
161. Increase of mortgage debt since last report,	None.
162. Present amount of mortgage debts,	250,000 00
163. Number of mortgages, on road and franchise or any property of the corporation,	One.

ACCIDENTS.

January 14.—James Burke, of Holyoke, while walking on the track at a bridge near Chicopee, was run over and killed.

September 1.—Hiram Hayward, of Springfield, an employé of the company, fell in

front of the cars while they were being switched in the yard at Northampton, and was so injured that he died on the 13th of September.

December 10.—Daniel Goodwin, of Brattleborough, jumped from the afternoon passenger train down while it was in motion, at South Vernon, fell upon the track, and had one leg cut off.

D. L. HARRIS,
I. M. SPELMAN,
EDWARD A. DANA,
S. M. WAITE,
C. W. CHAPIN,
W. B. WASHBURN,
OSCAR EDWARDS,
ROLAND MATHER,

Directors of the Connecticut River Railroad Corporation.

HAMPDEN, ss. November 9, 1870. Then personally appeared D. L. Harris, I. M. Spelman, Edward A. Dana, S. M. Waite, C. W. Chapin, W. B. Washburn, Oscar Edwards and Roland Mather, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

JOHN M. STEBBINS, *Justice of the Peace.*

REPORT
OF THE
DANVERS RAILROAD CORPORATION,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$100,000 00
2. Number of shares of capital stock issued,	583	
3. Increase of capital, since last report,	-	-
4. Capital paid in, per last report,	\$67,500 00	
5. Capital paid in, since last report,	-	-
6. Total amount of capital stock paid in,		67,500 00
7. Amount realized in cash value for stock issued,	-	-
8. Funded debt, per last report,	150,000 00	
9. Funded debt, paid since last report,	-	-
10. Funded debt, increase of, since last report,	-	-
11. Total present amount of funded debt,	-	-
12. Floating debt, per last report,		
13. Floating debt, paid since last report,		
14. Floating debt, increase of, since last report,		
15. Total present amount of floating debt,		
16. Total present amount of funded and floating debt,		
17. Whole amount in cash value realized from funded and floating debts,		
18. Whole amount in cash value realized from stock and debts,		
19. Average rate of interest per annum paid during the year,		
20. Maximum amount of debts during the year,		
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$90,208 49	
22. For graduation and masonry, paid during the past year,	-	-
23. Total am't expended for graduation and masonry,		\$90,208 49
24. For wooden bridges, per last report,	-	-
25. For wooden bridges, paid during the past year,	-	-
26. Total amount expended for wooden bridges,	-	-
27. Total amount expended for iron bridges, (if any,)	-	-
28. For superstructure, including iron, per last report,	81,101 69	
29. For superstructure, including iron, paid during the past year,	-	-
30. Total amount expended for superstructure, including iron,		81,101 69
31. For stations, buildings and fixtures, per last report,	9,524 17	
32. For stations, buildings and fixtures, paid during the past year,	-	-

The Danvers Railroad Company acknowledges no debt or other liabilities, except the debt of \$150,000, as above stated.

33. Total amount expended for stations, buildings and fixtures,		\$9,524 17
34. For land, land-damages and fences, per last report,	\$31,708 13	
35. For land, land-damages and fences, paid during the past year,	-	-
36. Total amount expended for land, land-damages and fences,		31,703 13
37. For locomotives, per last report,	-	-
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,	-	-
40. For passenger and baggage cars, per last report,	-	-
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,	-	-
43. For merchandise cars, per last report,	-	-
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,	-	-
46. For engineering, per last report,	2,615 00	
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		2,615 00
49. For agencies and other expenses, per last report,	29,303 54	
50. For agencies and other expenses, paid during the past year,	-	-
51. Total amount expended for agencies and other expenses,		29,303 54
52. Amounts of discounts or other sacrifices on stock and bonds issued,	4,491 44	
53. Total cost of road and equipment,		244,456 02
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans,; stocks and bonds, real estate,; fuel,	Nothing.	
55. Income expended in construction and equipment,	2,625 00	

CHARACTERISTICS OF ROAD.

56. Length of main road in this State,	9 miles, 1,368 feet.	
57. Length of main road in other States, (specifying how much in each,)	-	-
58. Length of single main track,	9 miles, 1,368 feet.	
59. Length of double main track,	None.	
60. Length of branches owned by the Company, stating whether they have a single or double track, and specifying length in this State, and in each other State,)	None.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	1,150 feet.	
62. Length of roads belonging to other companies operated by this Company,	-	-
63. Total miles of road operated by this Company,	-	-
64. Weight of rail, per yard, in main road,	50 lbs. and 60 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	-	-
66. Maximum grade, with its length, in main road,	50 feet, 6,100 feet.	
67. Maximum grade, with its length, in branch roads,	-	-
68. Total rise and fall in main road,	120 feet rise, 85 feet fall.	
69. Total rise and fall in branch roads,	-	-
70. Shortest radius of curvature, with length of curve, in main road,	-	-
71. Shortest radius of curvature, with length of curve, in branch roads,	-	-
72. Total degrees of curvature in main road,	351°	

73. Total degrees of curvature in branch roads, . . .	-	-
74. Total length of straight line in main road, . . .	5 miles, 3,900 ft.	-
75. Total length of straight line in branches, . . .	-	-
76. Aggregate length of wooden truss bridges, . . .	-	-
77. Aggregate length of all other wooden bridges, . . .	-	-
78. Aggregate length of iron bridges, . . .	-	-
79. Whole length of road unfenced on both sides, . . .	-	-
80. Number of public ways crossed at grade, . . .	14	-
81. Number of railroads crossed at grade, . . .	2	-
82. Remarks, . . .	-	-
83. Way stations for express trains, . . .	-	-
84. Way stations for accommodation trains, . . .	5	-
85. Flag stations, . . .	2	-
86. Whole number of way stations, . . .	5	-
87. Whole number of flag stations, . . .	2	-

NOTE.—This road is leased to Boston and Maine Railroad, and its “DOINGS DURING THE YEAR,” and its “INCOME” and “EXPENDITURES,” are included in the report of that road, its business being so intimately connected that separate accounts have not been kept.

FRANCIS COGSWELL,
PETER T. HOMER,
N. G. WHITE,
GEORGE C. LORD,
JOHN E. BICKFORD,

Directors of the Danvers Railroad Corporation.

SUFFOLK ss. November 1, 1870. Then personally appeared Francis Cogswell, Peter T. Homer, N. G. White, George C. Lord and John E. Bickford, and severally made oath to the truth of the foregoing statement by them subscribed, according to their best knowledge and belief.

Before

C. P. JUDD, *Justice of the Peace.*

R E P O R T

OF THE

DORCHESTER AND MILTON RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$130,000 00
2. Number of shares of capital stock issued,	733	
3. Increase of capital since last report,	-	-
4. Capital paid in, per last report,	\$73,340 00	
5. Capital paid in since last report,	-	-
6. Total amount of capital stock paid in,		73,340 00
7. Amount realized in cash value for stock issued,	-	-
8. Funded debt, per last report,	42,807 00	
9. Funded debt paid since last report,	-	-
10. Funded debt, increase of, since last report,	-	-
11. Total present amount of funded debt,		42,807 00
12. Floating debt, per last report,	15,641 07	
13. Floating debt paid since last report,	-	-
14. Floating debt, increase of, since last report,	-	-
15. Total present amount of floating debt,		15,641 07
16. Total present amount of funded and floating debt,		58,448 07
17. Whole amount in cash value realized from funded and floating debts,	-	-
18. Whole amount in cash value realized from stock and debts,	-	-
19. Average rate of interest per annum paid during the year,	-	-
20. Maximum amount of debts during the year,	58,448 07	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$40,724 80	
22. For graduation and masonry paid during the past year,	-	-
23. Total am't expended for graduation and masonry,		\$40,724 80
24. For wooden bridges, per last report,	6,209 02	
25. For wooden bridges, paid during th past year,	-	-
26. Total amount expended for wooden bridges,		6,209 02
27. Total amount expended for ironbries (if any,)	-	-
28. For superstructure, including iron, per last report,	30,051 73	
29. For superstructure, including iron, paid during the past year,	-	-
30. Total amount expended for superstructure, including iron,		30,051 73
31. For stations, buildings and fixtures, per last report,	11,508 69	
32. For stations, buildings and fixtures paid during the past year,	-	-

33. Total amount expended for stations, buildings and fixtures,		\$11,508 69
34. For land, land-damages and fences, per last report,	\$32,654 06	
35. For land, land-damages and fences, paid during the past year,	-	-
36. Total amount expended for land, land-damages and fences,		32,654 06
37. For locomotives, per last report,	-	-
38. For locomotives, paid during the past year,	-	-
39. Total amount expended for locomotives,	-	-
40. For passenger and baggage cars, per last report,	-	-
41. For passenger and baggage cars, paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,	-	-
43. For merchandise cars, per last report,	-	-
44. For merchandise cars, paid during the past year,	-	-
45. Total amount expended for merchandise cars,	-	-
46. For engineering, per last report,	10,155 82	
47. For engineering, paid during the past year,	-	-
48. Total amount expended for engineering,		10,155 82
49. For agencies and other expenses, per last report,	5,068 65	
50. For agencies and other expenses, paid during the past year,	-	-
51. Total amount expended for agencies and other expenses,	-	-
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,		186,872 77
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans,; stocks and bonds,; real estate,; fuel,	-	-
55. Income expended in construction and equipment,	-	-

CHARACTERISTICS OF ROAD.

56. Length of main road in this State,	3 miles, 1,300 feet.
57. Length of main road in other States,"(specifying how much in each,)	-
58. Length of single main track,	3 miles, 1,300 feet.
59. Length of double main track,	-
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	-
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	-
62. Length of roads belonging to other companies operated by this Company,	-
63. Total miles of road operated by this Company,	-
64. Weight of rail, per yard, in main road,	52 lbs.
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	-
66. Maximum grade, with its length, in main road,	{ 39 6-10 feet; whole distance, 6,000 feet.
67. Maximum grade, with its length, in branch roads,	
68. Total rise and fall in main road,	54½ feet.
69. Total rise and fall in branch roads,	-
70. Shortest radius of curvature, with length of curve, in main road,	410 feet radius; 200 feet.
71. Shortest radius of curvature, with length of curve, in branch roads,	-

72. Total degrees of curvature in main road, . . .	237½°	
73. Total degrees of curvature in branch roads, . . .	—	—
74. Total length of straight line in main road, . . .	2 42-100 miles.	
75. Total length of straight line in branches, . . .	—	—
76. Aggregate length of wooden truss bridges, . . .	—	—
77. Aggregate length of all other wooden bridges, . . .	—	—
78. Aggregate length of iron bridges, . . .	—	—
79. Whole length of road unfenced on both sides, . . .	1½ miles, salt marsh.	
80. Number of public ways crossed at grade, . . .	2	
81. Number of railroads crossed at grade, . . .	—	—
82. Remarks, . . .	—	—
83. Way stations for express trains, . . .	—	—
84. Way stations for accommodation trains, . . .	4	
85. Flag stations, . . .	2	
86. Whole number of way stations, . . .	4	
87. Whole number of flag stations, . . .	2	

DOINGS DURING THE YEAR.* [10 Mo.]

88. Miles run by passenger trains, . . .	
89. Miles run by freight trains, . . .	
90. Miles run by other trains, . . .	
91. Total miles run, . . .	
92. Number of passengers carried in the cars, . . .	
93. Number of passengers carried one mile, . . .	
94. Number of tons of merchandise carried in the cars, . . .	
95. Number of tons of merchandise carried one mile, . . .	
96. Number of passengers carried one mile, to and from other roads, . . .	
97. Number of tons carried one mile, to and from other roads, . . .	
98. Rate of speed adopted for express passenger trains, including stops, . . .	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions, . . .	
100. Rate of speed adopted for accommodation trains, . . .	
101. Rate of speed actually attained by accommodation trains, including stops and detentions, . . .	
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	
103. Average rate of speed adopted for freight trains, including stops, . . .	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile, . . .	
105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile, . . .	

Included in Report of Old Colony and Newport Railway Company.

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron, . . .	
107. For repairs of wooden bridges, . . .	
108. For wages of switchmen, average per month, . . .	\$
109. For wages of gate-keepers, average per month, . . .	
110. For wages of signal-men, average per month, . . .	
111. For wages of watchmen, average per month, . . .	

* All items under the headings marked with an asterisk are required by law for "the total miles of road operated by this company."

- 112. Number of men employed, exclusive of those engaged in construction,
- 113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)
- 114. For repairs of fences, gates, houses for signalmen, gate-keepers, switchmen, tool-houses,
- 115. Total for maintenance of way,

MOTIVE POWER AND CARS.

- 116. For repairs of locomotives,
- 117. For new locomotives, to cover depreciation,
- 118. For repairs of passenger cars,
- 119. For new passenger cars, to cover depreciation,
- 120. For repairs of merchandise cars,
- 121. For new merchandise cars, to cover depreciation,
- 122. For repairs of gravel and other cars,
- 123. Total for maintenance of motive power and cars,
- 124. Number of engines,
- 125. Number of passenger cars,
- 126. Number of baggage cars,
- 127. Number of merchandise cars,
- 128. Number of gravel cars,

MISCELLANEOUS.*

- 129. For fuel used by engines during the year, viz.:—
 - 1. Wood, No. of cords, Cost of the same,
 - 2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) Cost of same,
- 130. For oil used by cars and engines,
- 131. For waste and other material for cleaning,
- 132. For salaries, wages and incidental expenses, chargeable to passenger department,
- 133. For salaries, wages and incidental expenses, chargeable to freight department,
- 134. For gratuities and damages,
- 135. For taxes and insurance,
- 136. For ferries,
- 137. For repairs of station buildings, aqueducts, fixtures, furniture,
- 138. For renewals of iron, including laying down,
- 139. For new iron laid down, deducting the value of old iron taken up,
- 140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,
- 141. For amount paid other companies, as rent for use of their roads, specifying each company,
- 142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,
- 143. Total miscellaneous,
- 144. Total expenditures for working the road,
- 145. Total amount of interest paid during the year,

Included in Report of Old Colony and Newport Railway Company.

INCOME DURING THE YEAR.* [10 Mo.]

- 146. For Passengers.—
 - 1. On main road, including branches owned by company,

* See note on preceding page.

2. To and from other roads, specifying what, .		} Included in Report of Old Colony and Newport Railway Company.
147. For Freight :—		
1. On main road and branches owned by Co.,		
2. To and from other connecting roads, . . .		
148. U. S. mails,		
149. Rents,		
150. Total income,		
151. Net earnings, after deducting expenses, . . .		
DIVIDENDS.		
152. per cent. Total,		None made.
153. Surplus not divided,		None.
154. Surplus last year,		None.
155. Total surplus; cash and loans,		
stocks and bonds,	; real estate,	
fuel,		- -
ESTIMATED DEPRECIATION BEYOND THE RENEWALS,		
VIZ. :—		
156. Of road and bridges,		None.
157. Buildings,		None.
158. Engines and cars,		None.
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last report,		\$58,448 07
160. Mortgage debt paid since last report,		- -
161. Increase of mortgage debt since last report,		- -
162. Present amount of mortgage debts,		58,448 07
163. Number of mortgages on road and franchise, or any property of the Corporation,		5

ONSLOW STEARNS,
URIEL CROCKER,
NATH. F. SAFFORD,
Directors of the Dorchester and Milton Railroad Corporation.

SUFFOLK, ss. November 2, 1870. Then personally appeared Onalow Stearns,
Uriel Crocker, Nath'l F. Safford, and severally made oath to the truth of the forego-
ing statement by them subscribed.
Before JOHN M. WASHBURN, *Justice of the Peace.*

R E P O R T

OF THE

DUXBURY AND COHASSET RAILROAD COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

During the past ten months the whole amount of the capital stock has been subscribed, viz., \$350,000. Careful surveys of the route have been made, and two assessments on the capital stock have been made—20 per cent., payable September 20, 1870, and 30 per cent., payable January 10, 1871.

Of the first assessment, there had been paid in, prior to October 1, 1870, the sum of \$15,000.

ONSLOW STEARNS,
URIEL CROCKER,
J. O. COLE,
S. N. GIFFORD,
N. H. WHITING,
ROYAL W. TURNER,
JACOB H. LOUD,

Directors of the Duxbury and Cohasset Railroad Company.

SUFFOLK, ss. November 3, 1870. Then personally appeared Onslow Stearns, Uriel Crocker, J. O. Cole, S. N. Gifford, N. H. Whiting and R. W. Turner and J. H. Loud, and severally made oath to the truth of the foregoing statement by them subscribed.

Before me,

CHARLES F. CHOATE, *Justice of the Peace.*

REPORT

OF THE

EASTERN RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	\$6,160,000 00
2. Number of shares of capital stock issued,	40,626
3. Increase of capital since last report,	\$24,800 00
4. Capital paid in, per last report,	4,037,800 00
5. Capital paid in since last report,	24,800 00
6. Total amount of capital stock paid in,	4,062,600 00
7. Amount realized in cash value for stock issued,	4,141,599 87*
8. Funded debt, per last report,	2,900,400 00
9. Funded debt paid since last report,	75,000 00
10. Funded debt, increase of, since last report,	212,000 00
11. Total present amount of funded debt,	3,037,400 00
12. Floating debt, per last report,	450,200 00
13. Floating debt paid since last report,	-
14. Floating debt, increase of, since last report,	125,000 00
15. Total present amount of floating debt,	575,200 00
16. Total present amount of funded and floating debt,	3,612,600 00
17. Whole amount in cash value realized from funded and floating debts,	3,445,933 81*
18. Whole amount in cash value realized from stock and debts,	7,587,538 68*
19. Average rate of interest per annum paid during the year, [about,]	6 54-100 per cent.
20. Maximum amount of debts during the year,	3,767,600 00
COST OF ROAD AND EQUIPMENT.	
21. For graduation and masonry, per last report,	\$1,059,974 26
22. For graduation and masonry paid during the past year,	6,840 62
23. Total amount expended for graduation and masonry,	\$1,066,814 88
24. For wooden bridges, per last report,	814,033 77
25. For wooden bridges paid during the past year,	325 14
26. Total amount expended for wooden bridges,	814,358 91
27. Total amount expended for iron bridges, (if any,)	None.
28. For superstructure, including iron, per last report,	1,544,454 58
29. For superstructure, including iron, paid during the past year,	50,406 26
30. Total amount expended for superstructure, including iron,	1,594,860 84
31. For stations, buildings and fixtures, per last report,	952,057 63

* Estimated for past years.

32. For stations, buildings and fixtures paid during the past year,	\$26,437 60	
33. Total amount expended for stations, buildings and fixtures,		\$978,495 23
34. For land, land-damages and fences, per last report,	904,713 84	
35. For land, land-damages and fences paid during the past year,	65 00	
36. Total amount expended for land, land-damages, and fences,		904,778 84
37. For locomotives, per last report,	452,313 20	
38. For locomotives paid during the past year,	40,280 76	
39. Total amount expended for locomotives,		492,593 96
40. For passenger and baggage cars, per last report,	150,152 27	
41. For passenger and baggage cars paid during the past year,	66,910 89	
42. Total amount expended for passenger and baggage cars,		217,063 16
43. For merchandise cars, per last report,	244,848 95	
44. For merchandise cars paid during the past year,	39,381 31	
45. Total amount expended for merchandise cars,		284,230 26
46. For engineering, per last report,	328,845 69	
47. For engineering paid during the past year,	147 00	
48. Total amount expended for engineering,		328,992 69
49. For [new and unfinished work, &c.,] agencies and other expenses, per last report,	130,781 58	
50. For [new and unfinished work, &c., charged off,] agencies and other expenses, paid during the past year,	29,708 33	
51. Total amount expended for [new work, &c.,] agencies and other expenses,		101,073 25
52. Amounts of discounts or other sacrifices on stock and bonds issued,	241,666 19	
53. Total cost of road and equipment,		6,783,262 02
54. Amount of assets or property held by the corporation in addition to the cost of the road; cash and loans, \$171,922.32; stocks and bonds, \$316,085.51; real estate, \$203,358 39; fuel, [and rail iron,] \$151,517.39; [susp. account and balances,] \$229,596.89,	1,072,480 50	
55. Income expended in construction and equipment,	-	-

CHARACTERISTICS OF ROAD

EASTERN RAILROAD.

	MAIN ROAD.	BRANCHES				
		Marblehead.	Gloucester.	Fallsbury.	Saugus.	Lawrence.
56. Length of main road in this State,	44.10	-	-	-	-	-
57. Length of main road in other States, (specifying how much in each,) [In New Hampshire, 16, leased to this Co.,]	16.00	-	-	-	-	-
58. Length of single main track,	60.10	-	-	-	-	-
59.	17.76 m.	-	-	-	-	-
60.	-	-	-	-	-	-
61.	91,600 ft.	3.50 m. 1,698 ft.	16.66 m. 7,867 ft.	3.41 m. 3,416 ft.	10.10 m. 1,968 ft.	19.87 m. 20,580 ft.
62.	16.00	-	-	-	-	-
63.	160.35 m. 57, 60, 62	-	-	-	-	-
64. Weight of rail, per yard, in main road, [lbs.,]	55 lbs.	-	-	-	-	-
65. Weight of rail, per yard, in branch roads, (specify the different weights per y'd.,)	40 ft.	-	-	-	-	-
66. Maximum grade, with its length, in main road, [4,600 feet,]	40 ft.	-	-	-	-	-
67. Maximum grade, with its length, in branch roads,	578.297	-	-	-	-	-
68. Total rise and fall in main road,	-	-	-	-	-	-
69. Total rise and fall in branch roads,	1,000 ft.	-	-	-	-	-
70. Shortest radius of curvature, with length of curve, in main road, [radius, 1,140 ft.,]	450°	-	-	-	-	-
71. Shortest radius of curvature, with length of curve, in branch roads, [“ 1,146 ft.,]	28,495 ft.	-	-	-	-	-
72. Total degrees of curvature in main road,	1,294 ft.	-	-	-	-	-
73. Total degrees of curvature in branch roads,	9,384 ft.	-	-	-	-	-
74. Total length of straight line in main road,	None.	-	-	-	-	-
75. Total length of straight line in branches,	A'b't 2 m. 107	-	-	-	-	-
76. Aggregate length of wooden truss bridges,	6	-	-	-	-	-
77. Aggregate length of all other wooden bridges,	None.	-	-	-	-	-
78. Aggregate length of iron bridges,	2	-	-	-	-	-
79. Whole length of road unfenced on both sides,	18	-	-	-	-	-
80. Number of public ways crossed at grade,	12	-	-	-	-	-
81. Number of railroads crossed at grade, [3 horse & steam,]	13	-	-	-	-	-
82. Remarks,	12	-	-	-	-	-
83. Way stations for express trains,	2	-	-	-	-	-
84. Way stations for accommodation trains,	18	-	-	-	-	-
85. Flag stations,	12	-	-	-	-	-
86. Whole number of way stations,	13	-	-	-	-	-
87. Whole number of flag stations,	12	-	-	-	-	-

DOINGS DURING THE YEAR.*		
88. Miles run by passenger trains,	501,937	
89. Miles run by freight trains,	165,073	
90. Miles run by other trains,	183,689	
91. Total miles run,		850,699
92. Number of passengers carried in the cars,	3,545,649	
93. Number of passengers carried one mile,	51,220,764	
94. Number of tons of merchandise carried in the cars,	284,693	
95. Number of tons of merchandise carried one mile,	7,810,627	
96. Number of passengers carried one mile, to and from other roads,	3,509,804	
97. Number of tons carried one mile, to and from other roads,	3,260,036	
98. Rate of speed adopted for express passenger trains, including stops,	28 miles per hour.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	28 miles per hour.	
100. Rate of speed adopted for accommodation trains,	20 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	20 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	22 miles per hour.	
103. Average rate of speed adopted for freight trains, including stops,	12 miles per hour.	
104. Estimated weight, in tons, of passenger cars, (not including passengers,) hauled one mile,	10,244,153	
105. Estimated weight, in tons, of merchandise cars, (not including freight,) hauled one mile,	4,686,376	
EXPENDITURES FOR WORKING THE ROAD.*		
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$69,282 89	
107. For repairs of wooden bridges,	8,516 61	
108. For wages of switchmen, average per month,	\$47 50	} Total,
109. For wages of gate-keepers, average per month,	40 00	
110. For wages of signal-men, average per month,	45 00	
111. For wages of watchmen, average per month,	52 50	
112. Number of men employed, exclusive of those engaged in construction,	877	
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	2,028 08	
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,	2,976 07	
115. Total for maintenance of way,		\$107,035 14
MOTIVE POWER AND CARS.		
116. For repairs of locomotives,	\$74,985 28	
117. For new locomotives, to cover depreciation, [no depreciation,]	-	-
118. For repairs of passenger cars,	48,291 96	
119. For new passenger cars, to cover depreciation, [no depreciation,]	-	-

* All items under the headings marked with an asterisk, are required by law for " the total miles of road operated by this company."

120. For repairs of merchandise cars,	\$42,008 85	
121. For new merchandise cars, to cover depreciation, [no depreciation,]	—	—
122. For repairs of gravel and other cars, [in No. 121,]	—	—
123. Total for maintenance of motive power and cars,		\$165,286 09
124. Number of engines,	47	
125. Number of passenger cars,	86	
126. Number of baggage cars,	25	
127. Number of merchandise cars,	777	
128. Number of gravel cars,	83	
MISCELLANEOUS.*		
129. For fuel used by engines during the year, viz.:—		
1. Wood, number of cords, 1,627. Cost of the same,	\$13,940 27	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 13,548. Cost of same,	111,039 23	
130. For oil used by cars and engines, [and,]	}	13,150 20
131. For waste and other material for cleaning,		
132. For salaries, wages and incidental expenses, chargeable to passenger department,		186,200 19
133. For salaries, wages and incidental expenses, chargeable to freight department,		66,896 86
134. For gratuities and damages,		7,814 10
135. For taxes and insurance,		21,576 15
136. For ferries,		Nothing.
137. For repairs of station buildings, aqueducts, fix- tures, furniture,		80,397 04
138. For renewals of iron, including laying down, [and,]	}	71,337 34
139. For new iron laid down, deducting the value of old iron taken up,		
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,		Nothing.
141. For amount paid other companies, as rent for use of their roads, specifying each company, [Bos- ton and Maine Railroad,]		2,679 20
142. For salaries of president, treasurer, superintend- ent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,		22,144 89
143. Total miscellaneous,		\$547,175 47
144. Total expenditures for working the road,		819,496 70
145. Total amount of interest paid during the year,		173,746 12
		<u>\$993,242 82</u>
INCOME DURING THE YEAR.*		
146. For Passengers:—		
1. On main road, including branches owned by Company,	\$892,677 53	\$980,282 61
2. To and from other roads, specifying what,	87,605 08	
147. For Freight:—		
1. On main road and branches owned by Company,	292,084 47	376,054 07
2. To and from other connecting roads,	83,969 60	
148. U. S. mails,	12,725 28	
149. Rents, [and miscellaneous,]	98,708 19	
150. Total income,		1,462,770 10
151. Net earnings, after deducting expenses, [and U. S. tax, \$24,816.49,]	444,710 79	

* See note on preceding page.

DIVIDENDS.		
152. 8 per cent. Total, [and U. S. tax,]	.	\$383,523 74
153. Surplus not divided,	.	\$61,187 05
154. Surplus last year,	.	198,221 98
155. Total surplus; cash and loans,	.	
stocks and bonds,	.	
; real estate,	.	
; fuel,	.	259,409 03
[Less iron account, profit and loss,]	.	78,866 51
[Total surplus,]	.	180,542 52
ESTIMATED DEPRECIATION BEYOND THE RENEWALS,		
VIZ.:—		
156. Of road and bridges,	.	Nothing.
157. Buildings,	.	Nothing.
158. Engines and cars,	.	Nothing.
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage, of road and franchise or any property of the Corporation, per last report,	.	\$319,400 00
160. Mortgage debt paid since last report,	.	75,000 00
161. Increase of mortgage debt since last report,	.	None.
162. Present amount of mortgage debts,	.	244,400 00
163. Number of mortgages, on road and franchise or any property of the Corporation,	.	Two.

ACCIDENTS.

December 29, 1869.—Wm. S. Eustis fell under the cars at Salem, and was killed.

February 8, 1870.—Jas. Sinclair, in attempting to get upon a train at Salem while it was in motion, fell between the cars and was killed.

March 21.—H. Cate jumped from a train while it was in motion and was killed.

March 21.—W. H. N. Kimball stepped from a train at Lynn while it was in motion, and was killed.

April 25.—Mary E. Hart, a child, walking on the track near Lynn, was struck by a train and killed.

April 27.—Jere'h Linnihen, a child, who was playing on the track near Peabody, was run over by a train and killed.

June 24 —Rich'd Shannon, who was lying on the track near Lynn, was run over by a train and killed.

June 29.—E. B. Parsons, in attempting to get upon a train at Newburyport after it had started, fell under the cars and was killed.

July 14.—Pat'ck Lawrence, in attempting to leave a train at Lynn while it was in motion, fell under the cars and was killed.

August 4.—Margaret Lyons, a child, was run over by a train near Newburyport, and had a foot cut off.

September 7.—W. T. Sanborn, in attempting to leave a train at Salem after it had started, fell under the cars and was killed.

September 17.—T. Toomey, who was lying on the track at East Boston, was struck by a train and killed.

GEORGE M. BROWNE,
HENRY L. WILLIAMS,
FRANKLIN HAVEN,
BENJ. E. BATES,
S. HOOPER,
N. THAYER,
ICHABOD GOODWIN,

Directors of the Eastern Railroad Corporation.

SUFFOLK ss. October 26, 1870. Then personally appeared George M. Browne, Henry L. Williams, Franklin Haven, Benj. E. Bates, S. Hooper, N. Thayer and Ichabod Goodwin, and severally made oath to the truth of the foregoing statement by them subscribed, according to their best knowledge and belief.

Before

JOHN B. PARKER *Justice of the Peace.*

EASTON BRANCH RAILROAD CORPORATION.

[The Report of this Railroad (not received at date of printing), will be found on a subsequent page. See Index.]

REPORT
OF THE
FALL RIVER, WARREN AND PROVIDENCE RAILROAD
CORPORATION,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$150,000 00
2. Number of shares of capital stock issued,	1,500	
3. Increase of capital since last report,	Nothing.	
4. Capital paid in, per last report,	\$150,000 00	
5. Capital paid in since last report,	Nothing.	
6. Total amount of capital stock paid in,		150,000 00
7. Amount realized in cash value for stock issued,	150,000 00	
8. Funded debt, per last report,	—	—
9. Funded debt paid since last report,	—	—
10. Funded debt, increase of, since last report,	—	—
11. Total present amount of funded debt,	—	—
12. Floating debt, per last report,	255,450 00	
13. Floating debt paid since last report,	Nothing.	
14. Floating debt, increase of, since last report,	14,000 00	
15. Total present amount of floating debt,		269,450 00
16. Total present amount of funded and floating debt,		269,450 00
17. Whole amount in cash value realized from funded and floating debts,	269,450 00	
18. Whole amount in cash value realized from stock and debts,	419,450 00	
19. Average rate of interest per annum paid during the year,	8 per cent.	
20. Maximum amount of debts during the year,	269,450 00	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report, [\$161,242.48,]	{ Mass., \$135,714 16 R. I., 25,538 82	
22. For graduation and masonry paid during the past year,	Nothing.	
23. Total am't expended for graduation and masonry,		\$161,242 48
24. For wooden bridges, per last report,	25,957 97	
25. For wooden bridges paid during the past year,	Nothing.	
26. Total amount expended for wooden bridges,		25,957 97
27. Total amount expended for iron bridges, (if any,)	Nothing.	
28. For superstructure, including iron, per last report,	{ Mass., 47,896 11 R. I., 31,209 42	
29. For superstructure, including iron, paid during the past year,	Nothing.	
30. Total amount expended for superstructure, including iron,		79,105 53

31. For stations, buildings and fixtures, per last report,	{ Mass., \$8,985 12 R. I., 100 55	
32. For stations, buildings and fixtures paid during the past year,	Nothing.	
33. Total amount expended for stations, buildings and fixtures,		\$9,085 67
34. For land, land-damages and fences, per last report,	{ Mass., 11,928 06 R. I., 8,144 94	
35. For land, land-damages and fences paid during the past year,	Nothing.	
36. Total amount expended for land, land-damages and fences,		20,073 00
37. For locomotives, per last report,	} Rolling stock is hired by the Co.	
38. For locomotives paid during the past year,		
39. Total amount expended for locomotives,		
40. For passenger and baggage cars, per last report,		
41. For passenger and baggage cars paid during the past year,		
42. Total amount expended for passenger and baggage cars,		
43. For merchandise cars, per last report,	382 76	
44. For merchandise cars paid during the past year,	Nothing.	
45. Total amount expended for merchandise cars,		382 76
46. For engineering, per last report,	9,610 29	
47. For engineering paid during the past year,	Nothing.	
48. Total amount expended for engineering,		9,610 29
49. For agencies and other expenses, per last report,	2,872 45	
50. For agencies and other expenses paid during the past year,	Nothing.	
51. Total amount expended for agencies and other expenses,		2,872 45
52. Amounts of discounts or other sacrifices on stock and bonds issued,	Nothing.	
53. Total cost of road and equipment,	{ Mass., } R. I., }	330,089 25
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, \$490.87; stocks and bonds,; real estate, \$1,500; fuel, \$915; [Steamer "Oriole," \$21,759.10,]	-	-
55. Income expended in construction and equipment,	Nothing.	
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	3 662-1,000 miles.	
57. Length of main road in other States, (specifying how much in each,)	R. I., 2 182-1,000 miles.	
58. Length of single main track,	5 794-1,000 miles.	
59. Length of double main track,	None.	
60. Length of branches owned by the Company, stating whether they have a single or double track, and specifying length in this State, and in each other State,)	None.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	None.	
62. Length of roads belonging to other companies operated by this Company,	None.	
63. Total miles of road operated by this Company,	5 794-1,000 miles.	
64. Weight of rail, per yard, in main road,	56 lbs per yard.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	None.	
66. Maximum grade, with its length, in main road,	{ Mass., 56.23, 2,400 ft. long. R. I., 63.36, 1,600 ft. long.	

67. Maximum grade, with its length, in branch roads,	None.	
68. Total rise and fall in main road,	{ Mass., 99.750 } { R. I., 63.526 }	163.275
69. Total rise and fall in branch roads,	None.	
70. Shortest radius of curvature, with length of curve, in main road,	{ Mass., 1,433 ft. r., 850 ft. l. { R. I., 9,554 ft. r., 800 ft. l.	
71. Shortest radius of curvature, with length of curve, in branch roads,	None.	
72. Total degrees of curvature in main road,	{ Mass., 95° 59' { R. I., 114° 57'	
73. Total degrees of curvature in branch roads,	None.	
74. Total length of straight line in main road,	{ Mass., 15,916.5 } { R. I., 7,893.4 }	23,809.9
75. Total length of straight line in branches,	None.	
76. Aggregate length of wooden truss bridges,	{ Mass., 259 ft. 10 in. { R. I., 259 ft. 10 in.	
77. Aggregate length of all other wooden bridges,	Mass., 36 ft. ; R. I., 36 ft.	
78. Aggregate length of iron bridges,	None.	
79. Whole length of road unfenced on both sides,	No road unfenced.	
80. Number of public ways crossed at grade,	Mass., 1 ; R. I., 3=4.	
81. Number of railroads crossed at grade,	None.	
82. Remarks,	None.	
83. Way stations for express trains,	None.	
84. Way stations for accommodation trains,	2	
85. Flag stations,	None.	
86. Whole number of way stations,	2	
87. Whole number of flag stations,	None.	

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains,	10,846 miles.	
89. Miles run by freight trains,	None.	
90. Miles run by other trains,	None.	
91. Total miles run,		10,846
92. Number of passengers carried in the cars,	68,730	
93. Number of passengers carried one mile,	350,015	
94. Number of tons of merchandise carried in the cars,	1,807	
95. Number of tons of merchandise carried one mile,	10,851	
96. Number of passengers carried one mile, to and from other roads	336,021	
97. Number of tons carried one mile, to and from other roads,	None.	
98. Rate of speed adopted for express passenger trains, including stops,	None.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	None.	
100. Rate of speed adopted for accommodation trains,	24 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	24 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	None.	
103. Average rate of speed adopted for freight trains, including stops,	None.	
104. Estimated weight, in tons, of passenger cars (not including passengers) hauled one mile,	199,200	
105. Estimated weight, in tons, of merchandise cars, (not including freight) hauled one mile,	2,100 tons.	

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	{ Ms. \$7,532 03 } { R. I., 966 95 }	\$8,498 98
--	---	------------

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

107. For repairs of wooden bridges,	\$76 56	
108. For wages of switchmen, average per month,	\$86 13	} Total,
109. For wages of gate-keepers, average per month,	None.	
110. For wages of signal-men, average per month,	None.	
111. For wages of watchmen, average per month,	52 62 2-5	
112. Number of men employed, exclusive of those engaged in construction,	13	
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	Nothing.	
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,	Nothing.	
115. Total for maintenance of way,	\$9,963 08	

MOTIVE POWER AND CARS.

[Rent of locomotives and cars,]	\$1,500 00	
116. For repairs of locomotives,	241 82	
117. For new locomotives, to cover depreciation,	Nothing.	
118. For repairs of passenger cars,	164 79	
119. For new passenger cars, to cover depreciation,	None.	
120. For repairs of merchandise cars,	Nothing.	
121. For new merchandise cars, to cover depreciation,	None.	
122. For repairs of gravel and other cars,	Nothing.	
123. Total for maintenance of motive power and cars,	\$1,906 61	
124. Number of engines,	} Hired by the Company.	
125. Number of passenger cars,		
126. Number of baggage cars,		
127. Number of merchandise cars,		
128. Number of gravel cars,	1	
	None.	

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz. :—		
1. Wood, number of cords, 13. Cost of the same,	\$104 00	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 143 [tons]. Cost of same,	1,308 45	
130. For oil used by cars and engines,	309 09	
131. For waste and other material for cleaning,	30 40	
132. For salaries, wages, and incidental expenses, chargeable to passenger department,	4,048 91	
133. For salaries, wages, and incidental expenses, chargeable to freight department,	Nothing.	
134. For gratuities and damages,	43 00	
135. For taxes and insurance,	1,086 65	
136. For ferries,	Nothing. (See below.)	
137. For repairs of station buildings, aqueducts, fixtures, furniture,	689 56	
138. For renewals of iron, including laying down,	Nothing.	
139. For new iron laid down, deducting the value of old iron taken up,	Nothing.	
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	194 92—Old Colony R.R.	
141. For amount paid other companies, as rent for use of their roads, specifying each company,	Nothing.	

* See note on preceding page.

142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	\$500 00	
143. Total miscellaneous,	}	\$11,144 95
[Steamer " Oriole," \$3,330 47,]		
144. Total expenditures for working the road,		23,014 64
145. Total amount of interest paid during the year,		26,814 92

INCOME DURING THE YEAR.*

146. For <i>Passengers</i> :—		
1. On main road, including branches owned by company,	}	\$25,230 46
2. To and from other roads, specifying what,		
147. For <i>Freight</i> :—		
1. On main road, and branches owned by company,	}	1,234 46
2. To and from other connecting roads,		
148. U. S. mails,		850 00
149. Rents,		-
150. Total income,		\$26,814 92
151. Net earnings, after deducting expenses,		-

DIVIDENDS.

152. per cent. Total,	}	None.
153. Surplus not divided,		
154. Surplus last year,		
155. Total surplus; cash and loans, ; stocks and bonds, ; real estate, fuel,		

ESTIMATED DEPRECIATION BEYOND THE RENEWALS,
VIZ. :—

156. Of road and bridges,	}	Nothing.
157. Buildings,		
158. Engines and cars,		

MORTGAGE DEBTS.†

159. Amount of debts secured by mortgage of road and franchise, or any property of the corporation, per last report,	-	-
160. Mortgage debt paid since last report,	-	-
161. Increase of mortgage debt since last report,	-	-
162. Present amount of mortgage debts,	-	-
163. Number of mortgages on road and franchise, or any property of the corporation,	-	-

C. T. CHILD,
WM. S. SLATER,
CHAS. A. NICHOLS,
WINGATE HAYES,
JAMES Y. SMITH,
JEFFERSON BORDEN,
EARL P. MASON,

Directors of the Fall River, Warren and Providence Railroad Corporation.

† One mortgage of two hundred thousand dollars (\$200,000), on property of the Company to secure bonds for same amount, none of said bonds having yet been issued.

THE STATE OF RHODE ISLAND.

CITY AND COUNTY OF PROVIDENCE, ss. November 3, 1870. Then personally appeared Charles T. Child, William S. Slater, Charles A. Nichols, Wingate Hayes and James Y. Smith, and severally made oath to the truth of the foregoing statement by them subscribed.

Before me,

HENRY MARTIN, *Justice of the Peace.*

CITY AND COUNTY OF PROVIDENCE, R. I. November 4, A. D. 1870. Subscribed and sworn to by Earl P. Mason.

Before me,

HENRY MARTIN, *Justice of the Peace.*

COMMONWEALTH OF MASSACHUSETTS.

BRISTOL, ss. Fall River, November 3, 1870. Then personally appeared Jefferson Borden, and made oath to the truth of the annexed statement.

Before me,

R. C. BROWN, *Justice of the Peace.*

PROVIDENCE, R. I., November 4, 1870. The undersigned, Commissioners of the Fall River, Warren and Providence Railroad Company, have examined the above report, and believe it to be correct, and herewith approve the same.

CHARLES EDWARD POWERS,

Commissioner for Massachusetts.

JOHN B. HUMPHREYS,

Commissioner for Rhode Island.

Report of the Commissioners of the Fall River, Warren and Providence Railroad Company to the Legislature of Massachusetts, for the year ending September 30, 1870.

The undersigned, Commissioners of the Fall River, Warren and Providence Railroad Company, met at the office of the Company, in Providence, on Friday, November 4, 1870, for the purpose of investigating the accounts and expenditures of said Company, and for deciding what sums are applicable to that part of the road lying in the State of Massachusetts, and also what part is chargeable to that portion of the road lying in the State of Rhode Island; and having examined the accounts of said Company, we find that there has been expended for the road in Massachusetts, to the 30th of September, 1870, the sum of \$251,246 18
That there has been expended in Rhode Island, to the 30th of September, 1870, the sum of 78,843 07

Making the whole cost of the road, \$330,089 25

The Commissioners further report that the accounts of the expenditures on the road in each State have been kept separate and distinct, as required by the charter of the Company.

CHARLES EDWARD POWERS,

Commissioner for Massachusetts.

JOHN B. HUMPHREYS,

Commissioner for Rhode Island.

FITCHBURG RAILROAD CORPORATION.

[The Report of this Railroad (not received at date of printing), will be found on a subsequent page. See Index.]

R E P O R T

OF THE

FRAMINGHAM AND LOWELL RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

No progress has been made in the construction of the road, the requisite amount of stock not having been subscribed for.

H. A. BLOOD, *V. President*,
DAVID LANE,
RALPH WARNER,
P. B. BRIGHAM,
GEO. A. TORREY,
WM. F. ELLIS,
DANIEL WETHERBEE,
JAMES W. CLARK,
HOSEA HYDE,

Directors of the Framingham and Lowell Railroad Corporation.

SUFFOLK, ss. October 1, 1870. Then personally appeared H. A. Blood, David Lane, Ralph Warner, P. B. Brigham, Geo. A. Torrey, Wm. F. Ellis, Daniel Wetherbee, James W. Clark and Hosea Hyde, and severally made oath to the truth of the foregoing statement by them subscribed.

Before me,

GEO. E. TOWNE, *Justice of the Peace.*

R E P O R T

OF THE

HANOVER BRANCH RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$160,000 00
2. Number of shares of capital stock issued,	1,233	
3. Increase of capital since last report,	\$1,500 00	
4. Capital paid in, per last report,	122,000 00	
5. Capital paid in since last report,	1,500 00	
6. Total amount of capital stock paid in,		123,500 00
7. Amount realized in cash value for stock issued,	123,500 00	
8. Funded debt, per last report,	60,000 00	
9. Funded debt paid since last report,	—	—
10. Funded debt, increase of, since last report,	—	—
11. Total present amount of funded debt,		60,000 00
12. Floating debt, per last report,	7,000 00	
13. Floating debt paid since last report,	7,000 00	
14. Floating debt, increase of, since last report,	—	—
15. Total present amount of floating debt,	—	—
16. Total present amount of funded and floating debt,		60,000 00
17. Whole amount in cash value realized from funded and floating debts,	60,000 00	
18. Whole amount in cash value realized from stock and debts,	183,500 00	
19. Average rate of interest per annum, paid during the year,	7 5-6 per cent.	
20. Maximum amount of debts during the year,	67,000 00	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry per last report,	\$71,805 00	
22. For graduation and masonry paid during the past year,	—	—
23. Total amount expended for graduation and masonry,		\$71,805 00
24. For wooden bridges, per last report,	—	—
25. For wooden bridges paid during the past year,	—	—
26. Total amount expended for wooden bridges,	—	—
27. Total amount expended for iron bridges, (if any,)	—	—
28. For superstructure, including iron, per last report,	60,651 10	
29. For superstructure, including iron, paid during the past year,	—	—
30. Total amount expended for superstructure, including iron,		60,651 10
31. For stations, buildings and fixtures, per last report,	14,115 64	
32. For stations, buildings and fixtures, paid during the past year,	—	—
33. Total amount expended for stations, buildings and fixtures,		14,115 64

34. For land, land-damages and fences, per last report,	\$15,017 60	
35. For land, land-damages and fences, paid during the past year,	-	-
36. Total amount expended for land, land-damages, and fences,		\$15,017 60
37. For locomotives, per last report,	12,500 00	
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,		12,500 00
40. For passenger and baggage cars, per last report,	17,050 25	
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,		17,050 25
43. For merchandise cars, per last report,	7,500 00	
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,		7,500 00
46. For engineering, per last report,	2,400 00	
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		2,400 00
49. For agencies and other expenses, per last report,	-	-
50. For agencies and other expenses, paid during the past year,	-	-
51. Total amount expended for agencies and other expenses,	-	-
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,	-	-
54. Amount of assets or property held by the corporation in addition to the cost of the road; cash and loans,; stocks and bonds,; real estate,; fuel,	-	-
55. Income expended in construction and equipment,	21,405 94	
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	7½ miles.	
57. Length of main road in other States, (specifying how much in each,)	-	-
58. Length of single main track,	7½ miles.	
59. Length of double main track,	-	-
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	-	-
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	½ mile.	
62. Length of roads belonging to other companies operated by this Company,	-	-
63. Total miles of road operated by this Company,	8½ miles.	
64. Weight of rail, per yard, in main road,	50 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	-	-
66. Maximum grade, with its length, in main road,	92 4-10 feet per mile.	
67. Maximum grade, with its length, in branch roads,	-	-
68. Total rise and fall in main road,	317 feet.	
69. Total rise and fall in branch roads,	-	-
70. Shortest radius of curvature, with length of curve, in main road,	1,000 feet; 1,156 feet.	
71. Shortest radius of curvature, with length of curve, in branch roads,	-	-
72. Total degrees of curvature in main road,	372° 37'	
73. Total degrees of curvature in branch roads,	-	-
74. Total length of straight line in main road,	26,472 feet.	

75. Total length of straight line in branches, . . .	-	-
76. Aggregate length of wooden truss bridges, . . .	-	-
77. Aggregate length of all other wooden bridges, . . .	26 feet.	-
78. Aggregate length of iron bridges, . . .	-	-
79. Whole length of road unfenced on both sides, . . .	1 mile.	-
80. Number of public ways crossed at grade, . . .	18	-
81. Number of railroads crossed at grade, . . .	-	-
82. Remarks, . . .	-	-
83. Way stations for express trains, . . .	-	-
84. Way stations for accommodation trains, . . .	4	-
85. Flag stations, . . .	2	-
86. Whole number of way stations, . . .	4	-
87. Whole number of flag stations, . . .	2	-

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains, . . .	17,000	-
89. Miles run by freight trains, . . .	4,017	-
90. Miles run by other trains, . . .	-	-
91. Total miles run, . . .	-	-
92. Number of passengers carried in the cars, . . .	60,970	-
93. Number of passengers carried one mile, . . .	243,880	-
94. Number of tons of merchandise carried in the cars, . . .	10,990	-
95. Number of tons of merchandise carried one mile, . . .	43,970	-
96. Number of passengers carried one mile to and from other roads, . . .	-	-
97. Number of tons carried one mile to and from other roads, . . .	-	-
98. Rate of speed adopted for express passenger trains, including stops, . . .	-	-
99. Average rate of speed actually attained by express passenger trains, including stops and detentions, . . .	-	-
100. Rate of speed adopted for accommodation trains, . . .	20 miles per hour.	-
101. Rate of speed actually attained by accommodation trains, including stops and detentions, . . .	16 miles per hour.	-
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	-	-
103. Average rate of speed adopted for freight trains, including stops, . . .	16 miles per hour.	-
104. Estimated weight, in tons, of passenger cars (not including passengers) hauled one mile, . . .	-	-
105. Estimated weight, in tons, of merchandise cars, (not including freight) hauled one mile, . . .	-	-

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges and renewals of iron, . . .	\$500 00	-
107. For repairs of wooden bridges, . . .	-	-
108. For wages of switchmen, average per month, . . . \$	Total,	18
109. For wages of gate-keepers, average per month, . . .		
110. For wages of signal-men, average per month, . . .		
111. For wages of watchmen, average per month, . . .		
112. Number of men employed, exclusive of those engaged in construction, . . .		

* All items under the headings marked with an asterisk, are required by law for " the total miles of road operated by this company."

113. For removing ice and snow (this item to include all labor, tools, repairs, and extra steam-power used,)	\$200 00	
114. For repairs of fences, gates, houses for signalmen, gate-keepers, switchmen, tool-houses,	-	-
115. Total for maintenance of way,		\$700 00

MOTIVE POWER AND CARS.

116. For repairs of locomotives,	\$200 00	
117. For new locomotives, to cover depreciation,	-	-
118. For repairs of passenger cars,	150 00	
119. For new passenger cars, to cover depreciation,	-	-
120. For repairs of merchandise cars,	50 00	
121. For new merchandise cars, to cover depreciation,	-	-
122. For repairs of gravel and other cars,	-	-
123. Total for maintenance of motive power and cars,		\$400 00
124. Number of engines,	2	
125. Number of passenger cars,	5	
126. Number of baggage cars,	2	
127. Number of merchandise cars,	12	
128. Number of gravel cars,	-	-

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz. :—		
1. Wood, No. of cords, Cost of the same,	}	\$2,350 20
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) Cost of same,		
130. For oil used by cars and engines,	}	275 00
131. For waste and other material for cleaning,		
132. For salaries, wages and incidental expenses, chargeable to passenger department,		5,098 80
133. For salaries, wages and incidental expenses, chargeable to freight department,		2,512 00
134. For gratuities and damages,		-
135. For taxes and insurance,		1,224 10
136. For ferries,		-
137. For repairs of station buildings, aqueducts, fixtures, furniture,		-
138. For renewals of iron, including laying down,		500 00
139. For new iron laid down, deducting the value of old iron taken up,		-
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,		-
141. For amount paid other companies as rent for use of their roads, specifying each company,		-
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,		800 00
143. Total miscellaneous,		\$12,760 10
144. Total expenditures for working the road,		18,860 10
145. Total amount of interest paid during the year,		3,830 00

INCOME DURING THE YEAR.*

146. For Passengers :—	
1. On main road, including branches owned by company,	} \$18,500 00
2. To and from other roads, specifying what,	

* See note on preceding page.

147. <i>For Freight</i> :—		
1. On main road and branches owned by company,	}	\$7,090 10
2. To and from other connecting roads,		
148. U. S. mails,		150 00
149. Rents,		—
150. Total income,		\$25,740 10
151. Net earnings, after deducting expenses,		8,050 00
DIVIDENDS.		
152. per cent. Total,		—
153. Surplus not divided,		—
154. Surplus last year,		—
155. Total surplus, cash and loans, ; stocks and bonds, ; real estate, ; fuel,		—
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—		
156. Of road and bridges,		—
157. Buildings,		—
158. Engines and cars,		—
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage of road and franchise, or any property of the Corpora- tion, per last Report,		—
160. Mortgage debt paid since last Report,		—
161. Increase of mortgage debt since last Report,		—
162. Present amount of mortgage debts,		\$50,000 00
163. Number of mortgages on road and franchise, or any property of the Corporation,	1	

EDWARD Y. PERRY,
E. Q. SYLVESTER,
Directors of the Hanover Branch Railroad Corporation.

PLYMOUTH, ss. October 20, 1870. Then personally appeared Edward Y. Perry
and E. Q. Sylvester, and severally made oath to the truth of the foregoing statement
by them subscribed.

Before ZENAS JENKINS, *Justice of the Peace.*

HARTFORD AND NEW HAVEN RAILROAD CORPORATION.

[The Report of this Railroad, (not received at date of printing), will be found on a subsequent page. See Index.]

REPORT
OF THE
HORN POND BRANCH RAILROAD CORPORATION,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$10,000 00
2. Number of shares of capital stock issued,	100	
3. Increase of capital since last report,	None.	
4. Capital paid in, per last report,	\$2,000 00	
5. Capital paid in since last report,	None.	
6. Total amount of capital stock paid in,		2,000 00
7. Amount realized in cash value for stock issued,	}	None.
8. Funded debt, per last report,		
9. Funded debt paid since last report,		
10. Funded debt, increase of, since last report,		
11. Total present amount of funded debt,		
12. Floating debt, per last report,		
13. Floating debt paid since last report,		
14. Floating debt, increase of, since last report,		
15. Total present amount of floating debt,		
16. Total present amount of funded and floating debt,		
17. Whole amount in cash value realized from funded and floating debts,	}	None.
18. Whole amount in cash value realized from stock and debts,		
19. Average rate of interest per annum paid during the year,		
20. Maximum amount of debts during the year,		
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$3,946 05	
22. For graduation and masonry paid during the past year,	Nothing.	
23. Total am't expended for graduation and masonry,		\$3,946 05
24. For wooden bridges, per last report,	}	1,766 96
25. For wooden bridges paid during the past year,		
26. Total amount expended for wooden bridges,	}	Belong to Boston and Lowell Railroad.
27. Total amount expended for iron bridges, (if any,)		
28. For superstructure, including iron, per last report,		
29. For superstructure, including iron, paid during the past year,		
30. Total amount expended for superstructure, including iron,	}	Nothing.
31. For stations, buildings and fixtures, per last report,		
32. For stations, buildings and fixtures paid during the past year,		

33. Total amount expended for stations, buildings and fixtures,	} Nothing.	
34. For land, land-damages and fences, per last report,		\$6,438 36
35. For land, land-damages and fences paid during the past year,		-
36. Total amount expended for land, land-damages, and fences,		\$6,438 36
37. For locomotives, per last report,	} .	
38. For locomotives paid during the past year,		
39. Total amount expended for locomotives,		
40. For passenger and baggage cars, per last report,		
41. For passenger and baggage cars paid during the past year,		
42. Total amount expended for passenger and baggage cars,	} Nothing.	
43. For merchandise cars, per last report,		
44. For merchandise cars paid during the past year,		
45. Total amount expended for merchandise cars,		
46. For engineering, per last report,		-
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		924 16
49. For agencies and other expenses, per last report,	}	
50. For agencies and other expenses paid during the past year,		
51. Total amount expended for agencies and other expenses,		
52. Amounts of discounts or other sacrifices on stock and bonds issued,	} Nothing. Road operated by Boston and Lowell R. R.	
53. Total cost of road and equipment,		
54. Amount of assets or property held by the corporation in addition to the cost of the road; cash and loans, ; stocks and bonds, real estate, ; fuel,		
55. Income expended in construction and equipment,		
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,		About 3,500 feet.
57. Length of main road in other States, (specifying how much in each,)		-
58. Length of single main track,		3,500 feet.
59. Length of double main track,		-
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)		-
61. Aggregate length of sidings, and other tracks, excepting main track and branches,		400 feet.
62. Length of roads belonging to other companies operated by this Company,		-
63. Total miles of road operated by this Company,		-
64. Weight of rail, per yard, in main road,		56 lbs.
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)		-
66. Maximum grade, with its length, in main road,		380.6 ft. per mile for 450 ft.
67. Maximum grade, with its length in branch roads,		-
68. Total rise and fall in main road,		-
69. Total rise and fall in branch roads,		-
70. Shortest radius of curvature, with length of curve, in main road,		501.6 ft. for 775.5 ft.
71. Shortest radius of curvature, with length of curve, in branch roads,		-
72. Total degrees of curvature in main road,		217° 9' 14"

73. Total degrees of curvature in branch roads, . . .	-	-
74. Total length of straight line in main road, . . .	660 feet.	-
75. Total length of straight line in branches, . . .	-	-
76. Aggregate length of wooden truss bridges, . . .	-	-
77. Aggregate length of all other wooden bridges, . . .	15 feet.	-
78. Aggregate length of iron bridges, . . .	} None.	}
79. Whole length of road unfenced on both sides, . . .		
80. Number of public ways crossed at grade, . . .		
81. Number of railroads crossed at grade, . . .		
82. Remarks, . . .	} One.	}
83. Way stations for express trains, . . .		
84. Way stations for accommodation trains, . . .		
85. Flag stations, . . .	-	-
86. Whole number of way stations, . . .	One.	-
87. Whole number of flag stations, . . .	-	-
DOINGS DURING THE YEAR.*		
88. Miles run by passenger trains, . . .	-	-
89. Miles run by freight trains, . . .	-	-
90. Miles run by other trains, . . .	-	-
91. Total miles run, . . .	-	-
92. Number of passengers carried in the cars, . . .	-	-
93. Number of passengers carried one mile, . . .	-	-
94. Number of tons of merchandise carried in the cars, . . .	} 20,000 tons carried about 3,500 ft.	}
95. Number of tons of merchandise carried one mile, . . .		
96. Number of passengers carried one mile, to and from other roads, . . .	-	-
97. Number of tons carried one mile, to and from other roads, . . .	-	-
98. Rate of speed adopted for express passenger trains, including stops, . . .	-	-
99. Average rate of speed actually attained by express passenger trains, including stops and detentions, . . .	-	-
100. Rate of speed adopted for accommodation trains, . . .	-	-
101. Rate of speed actually attained by accommodation trains, including stops and detentions, . . .	-	-
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	-	-
103. Average rate of speed adopted for freight trains, including stops, . . .	8 miles per hour.	-
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile, . . .	-	-
105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile, . . .	} 20,000 tons carried about 3,500 ft.	}
EXPENDITURES FOR WORKING THE ROAD.*		
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron, . . .	} Nothing. Road operated by Boston and Lowell R. R.	}
107. For repairs of wooden bridges, . . .		
108. For wages of switchmen, average per month, . . . \$		
109. For wages of gate-keepers, average per month, . . .		
110. For wages of signal-men, average per month, . . .		
111. For wages of watchmen, average per month, . . .		

* All items under the headings marked with an asterisk, are required by law for " the total miles of road operated by this company."

- 112. Number of men employed, exclusive of those engaged in construction,
- 113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)
- 114. For repairs of fences, gates, houses for signalmen, gate-keepers, switchmen, tool-houses,
- 115. Total for maintenance of way,

MOTIVE POWER AND CARS.

- 116. For repairs of locomotives,
- 117. For new locomotives, to cover depreciation,
- 118. For repairs of passenger cars,
- 119. For new passenger cars, to cover depreciation,
- 120. For repairs of merchandise cars,
- 121. For new merchandise cars, to cover depreciation,
- 122. For repairs of gravel and other cars,
- 123. Total for maintenance of motive power and cars,
- 124. Number of engines,
- 125. Number of passenger cars,
- 126. Number of baggage cars,
- 127. Number of merchandise cars,
- 128. Number of gravel cars,

MISCELLANEOUS.*

- 129. For fuel used by engines during the year, viz.:—
 - 1. Wood, number of cords, Cost of the same,
 - 2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) Cost of same,
- 130. For oil used by cars and engines,
- 131. For waste and other material for cleaning,
- 132. For salaries, wages, and incidental expenses, chargeable to passenger department,
- 133. For salaries, wages, and incidental expenses, chargeable to freight department,
- 134. For gratuities and damages,
- 135. For taxes and insurance,
- 136. For ferries,
- 137. For repairs of station buildings, aqueducts, fixtures, furniture,
- 138. For renewals of iron, including laying down,
- 139. For new iron laid down, deducting the value of old iron taken up,
- 140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,
- 141. For amount paid other companies, as rent for use of their roads, specifying each company,
- 142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,
- 143. Total miscellaneous,
- 144. Total expenditures for working the road,
- 145. Total amount of interest paid during the year,

Nothing. Road operated by Boston and Lowell R. R.

* See note on preceding page.

INCOME DURING THE YEAR.*	
146. For Passengers :—	
1. On main road including branches owned by company,	
2. To and from other roads, specifying what,	
147. For Freight :	
1. On main road and branches owned by company,	
2. To and from other connecting roads,	
148. U. S. mails,	
149. Rents,	
150. Total income,	
151. Net earnings, after deducting expenses,	
DIVIDENDS.	
152. per cent. Total,	
153. Surplus not divided,	
154. Surplus last year,	
155. Total surplus; cash and loans,	
stocks and bonds,	
fuel,	
ESTIMATED DEPRECIATION BEYOND THE RENEWALS,	
VIZ. :—	
156. Of road and bridges,	
157. Buildings,	
158. Engines and cars,	
MORTGAGE DEBTS.	
159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last Report,	
160. Mortgage debt paid since last report,	
161. Increase of mortgage debt since last report,	
162. Present amount of mortgage debts,	
163. Number of mortgages, on road and franchise or any property of the Corporation,	

FRANCIS HALL,
HORACE O. BRIGHT,
NELSON BARTLETT,
WM. P. DRAPER,
Directors of the Horn Pond Branch Railroad Corporation.

MIDDLESEX, ss. November 15, 1870. Then personally appeared Francis Hall, Horace O. Bright and Nelson Bartlett, and severally made oath to the truth of the foregoing statement by them subscribed.
Before me, GUSTAVUS V. HALL, *Justice of the Peace.*

LEXINGTON AND ARLINGTON R. R. CORPORATION.

[The Lexington and Arlington Railroad was purchased by the Boston and Lowell Railroad Company, Dec. 1, 1869, and is included in the report of that corporation.]

REPORT
OF THE
LOWELL AND LAWRENCE RAILROAD CORPORATION,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$300,000 00
2. Number of shares of capital stock issued,	2,000	
3. Increase of capital since last report,	None.	
4. Capital paid in, per last report,	\$200,000 00	
5. Capital paid in since last report,	None.	
6. Total amount of capital stock paid in,		200,000 00
7. Amount realized in cash value for stock issued,	200,000 00	
8. Funded debt, per last report,	67,700 00	
9. Funded debt paid since last report,	None.	
10. Funded debt, increase of, since last report,	None.	
11. Total present amount of funded debt,		67,700 00
12. Floating debt, per last report,	1,523 33	
13. Floating debt paid since last report,	None.	
14. Floating debt, increase of, since last report,	10,006 14	
15. Total present amount of floating debt, [unpaid dividends, interest warrants and taxes,]		11,529 47
16. Total present amount of funded and floating debt,		79,229 47
17. Whole amount in cash value realized from funded and floating debts,	90,000 00	
18. Whole amount in cash value realized from stock and debts,	290,000 00	
19. Average rate of interest per annum paid during the year,	Six per cent. on bonds.	
20. Maximum amount of debts during the year, [including funded and floating debts,]	79,227 47	
[Surplus—contra, \$8,603 30,]	}	99,061 42
[Paid from earnings—contra, 95,458 12,]		
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$77,516 32	
22. For graduation and masonry paid during the past year,	Nothing.	
23. Total am't expended for graduation and masonry,		\$77,516 32
24. For wooden bridges, per last report,	5,304 61	
25. For wooden bridges, paid during th past year,	Nothing.	
26. Total amount expended for wooden bridges,		5,304 61
27. Total amount expended for iron bridges (if any,)	Nothing.	
28. For superstructure, including iron, per last report,	161,416 37	
29. For superstructure, including iron, paid during the past year,	Nothing.	
30. Total amount expended for superstructure, including iron,		161,416 37

31. For stations, buildings and fixtures, per last report,	\$15,108 19	
32. For stations, buildings and fixtures paid during the past year,	Nothing.	
33. Total amount expended for stations, buildings and fixtures,		\$15,108 19
34. For land, land-damages and fences, per last report,	45,378 81	
35. For land, land-damages and fences, paid during the past year,	Nothing.	
36. Total amount expended for land, land-damages and fences,		45,378 81
37. For locomotives, per last report,	15,153 25	
38. For locomotives, paid during the past year,	Nothing.	
39. Total amount expended for locomotives,		15,153 25
40. For passenger and baggage cars, per last report,	7,000 60	
41. For passenger and baggage cars, paid during the past year,	Nothing.	
42. Total amount expended for passenger and baggage cars,		7,000 60
43. For merchandise cars, per last report,	8,121 43	
44. For merchandise cars, paid during the past year,	Nothing.	
45. Total amount expended for merchandise cars,		8,121 43
46. For engineering, per last report,	8,197 85	
47. For engineering, paid during the past year,	Nothing.	
48. Total amount expended for engineering,		8,197 85
49. For agencies and other expenses, per last report,	212 64	
50. For agencies and other expenses, paid during the past year,	Nothing.	
51. Total amount expended for agencies and other expenses,		212 64
52. Amounts of discounts or other sacrifices on stock and bonds issued, [bonds,] [Balance of interest on loan during construction, and paid stockholders,]	10,000 00 } 9,748 05 }	19,748 05
53. Total cost of road and equipment,		363,158 12
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, \$15,132 77; stocks and bonds, [None;] real estate, [None;] fuel, [None,]		15,132 77
55. Income expended in construction and equipment,	73,158 12	378,290 89
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	12.35 miles.	
57. Length of main road in other States, (specifying how much in each,)	None.	
58. Length of single main track,	12.35 miles.	
59. Length of double main track,	None.	
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	None.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	2 miles, 1,788 feet.	
62. Length of roads belonging to other companies operated by this Company,	None.	
63. Total miles of road operated by this Company,	None.	
64. Weight of rail, per yard, in main road,	56 lbs.; renewals, 60 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	None.	
66. Maximum grade, with its length, in main road,	45 40 feet, 2.32 miles.	
67. Maximum grade, with its length, in branch roads,	None.	
68. Total rise and fall in main road,	Rise, 115.77 ft.; fall, 162.70 ft.	

69. Total rise and fall in branch roads,	None.
70. Shortest radius of curvature, with length of curve, in main road,	1,146 ft. ; length, 1,100 ft.
71. Shortest radius of curvature, with length of curve, in branch roads,	None.
72. Total degrees of curvature in main road,	420
73. Total degrees of curvature in branch roads,	None.
74. Total length of straight line in main road,	8.86 miles.
75. Total length of straight line in branches,	None.
76. Aggregate length of wooden truss bridges,	65 feet.
77. Aggregate length of all other wooden bridges,	335 feet.
78. Aggregate length of iron bridges,	None.
79. Whole length of road unfenced on both sides,	{ All fenced in or otherwise protected.
80. Number of public ways crossed at grade,	12
81. Number of railroads crossed at grade,	2
82. Remarks,	-
83. Way stations for express trains,	None.
84. Way stations for accommodation trains,	None.
85. Flag stations,	6
86. Whole number of way stations,	None.
87. Whole number of flag stations,	6

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains,	} Operated by the Boston and Lowell Railroad Corporation, under a contract. A copy is annexed to the report of 1858.
89. Miles run by freight trains,	
90. Miles run by other trains,	
91. Total miles run,	
92. Number of passengers carried in the cars,	
93. Number of passengers carried one mile,	
94. Number of tons of merchandise carried in the cars,	
95. Number of tons of merchandise carried one mile,	
96. Number of passengers carried one mile, to and from other roads,	
97. Number of tons carried one mile, to and from other roads,	
98. Rate of speed adopted for express passenger trains, including stops,	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	
100. Rate of speed adopted for accommodation trains,	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	
102. Average rate of speed actually attained by special trains, including stops and detentions,	
103. Average rate of speed adopted for freight trains, including stops,	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile,	
105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile,	

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	} Paid by the Boston and Lowell Railroad Corporation.
107. For repairs of wooden bridges,	

* All items under the headings marked with an asterisk are required by law for "the total miles of road operated by this company."

108. For wages of switchmen, average per month,	\$		
109. For wages of gate-keepers, average per month,			
110. For wages of signal-men, average per month,			
111. For wages of watchmen, average per month,			
112. Number of men employed, exclusive of those engaged in construction,			
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)			
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,			
115. Total for maintenance of way,			
MOTIVE POWER AND CARS.			
116. For repairs of locomotives,			
117. For new locomotives, to cover depreciation,			
118. For repairs of passenger cars,			
119. For new passenger cars, to cover depreciation,			
120. For repairs of merchandise cars,			
121. For new merchandise cars, to cover depreciation,			
122. For repairs of gravel and other cars,			
123. Total for maintenance of motive power and cars,			
124. Number of engines,		2	
125. Number of passenger cars,		3	
126. Number of baggage cars,		1	
127. Number of merchandise cars,		20	
128. Number of gravel cars,		6	
MISCELLANEOUS.*			
129. For fuel used by engines during the year, viz.:—			
1. Wood, No. of cords, Cost of the same,			
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) Cost of same,			
130. For oil used by cars and engines,			
131. For waste and other material for cleaning,			
132. For salaries, wages and incidental expenses, chargeable to passenger department,			
133. For salaries, wages and incidental expenses, chargeable to freight department,			
134. For gratuities and damages,			
135. For taxes and insurance,			
136. For ferries,			
137. For repairs of station buildings, aqueducts, fixtures, furniture,			
138. For renewals of iron, including laying down,			
139. For new iron laid down, deducting the value of old iron taken up,			
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,			
141. For amount paid other companies, as rent for use of their roads, specifying each company,			
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,			

Paid by the Boston and Lowell Railroad Corporation.

Run by the Boston and Lowell Railroad Corporation.

Operated by the Boston and Lowell Railroad Corporation.

\$3,541 22

Operated by the Boston and Lowell Railroad Corporation.

\$100 20

* See note on preceding page.

143. Total miscellaneous,		\$3,641 42
144. Total expenditures for working the road,	3,641 42	
145. Total amount of interest paid during the year,		3,310 83

\$6,952 25

INCOME DURING THE YEAR.*

146. <i>For Passengers</i> .—	} Operated by the Boston and Lowell Railroad Corporation, under a contract which [pays six per cent. on \$363,000.	
1. On main road, including branches owned by company,		
2. To and from other roads, specifying what,		
147. <i>For Freight</i> :—		
1. On main road and branches owned by Co.,		
2. To and from other connecting roads,		
148. U. S. mails,		
149. Rents,	\$20,403 97	
150. Total income,		\$20,403 97
151. Net earnings, after deducting expenses,	13,451 72	

DIVIDENDS.

152. †6 per cent. Total,		\$12,000 00
153. Surplus not divided,	\$1,451 72	
154. Surplus last year,	2,151 58	
155. Total surplus; cash and loans, \$15,132.77; stocks and bonds, [None;] real estate, [None;] fuel, [None,]		3,603 30

ESTIMATED DEPRECIATION BEYOND THE RENEWALS,
VIZ. :—

156. Of road and bridges,	} Run and kept in repair by the Boston and Lowell Railroad Corporation.	
157. Buildings,		
158. Engines and cars,		

MORTGAGE DEBTS.

159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last report,	\$67,700 00
160. Mortgage debt paid since last report,	None.
161. Increase of mortgage debt since last report,	None.
162. Present amount of mortgage debts,	67,700 00
163. Number of mortgages on road and franchise, or any property of the Corporation,	One.

ACCIDENTS.

December 2, 1869.—Lewis Lane of Rockport, while unlawfully walking on the track at Lawrence, was struck by a train, receiving injuries which caused his death.

July 11, 1870.—William A. Agnew, an employé, while standing upon a freight car, was struck by a bridge and severely injured.

August 31.—John Chandler, an employé, while standing upon the top of a freight train, was struck by a bridge near Lowell, receiving injuries resulting in death.

F. B. CROWNINSHIELD,
J. G. ABBOTT,
H. HOSFORD,
EDWARD W. CODMAN,

Directors of the Boston and Lowell Railroad Corporation.

† September 22d, three per cent. of the above dividend was declared, and payable October 8d, 1870.

SUFFOLK, ss. November 18, 1870. Then personally appeared F. B. Crowninshield, J. G. Abbott and Edward W. Codman, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

C. E. A. BARTLETT, *Justice of the Peace.*

SUFFOLK, ss. November 19, 1870. Then personally appeared H. Hosford, and made oath to the truth of the foregoing statement by him subscribed.

Before

C. E. A. BARTLETT, *Justice of the Peace.*

R E P O R T

OF THE

MANSFIELD AND FRAMINGHAM R. R. CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$600,000 00
2. Number of shares of capital stock issued,	2,580	
3. Increase of capital, since last report,	340 shares.	
4. Capital paid in, per last report,	\$224,000 00	
5. Capital paid in, since last report,	34,000 00	
6. Total amount of capital stock paid in,		258,000 00
7. Amount realized in cash value for stock issued,	258,000 00	
8. Funded debt, per last report,	146,500 00	
9. Funded debt, paid since last report,	—	—
10. Funded debt, increase of, since last report,	153,500 00	
11. Total present amount of funded debt,		300,000 00
12. Floating debt, per last report,	46,581 19	
13. Floating debt, paid since last report,	—	—
14. Floating debt, increase of, since last report,	52,274 24	
15. Total present amount of floating debt,		98,855 43
16. Total present amount of funded and floating debt,		398,855 43
17. Whole amount in cash value realized from funded and floating debts,	—	—
18. Whole amount in cash value realized from stock and debts,	—	—
19. Average rate of interest per annum paid during the year,	7 per cent.	
20. Maximum amount of debts during the year,	—	—
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$102,833 70	
22. For graduation and masonry, paid during the past year,	92,282 58	
23. Total am't expended for graduation and masonry,		\$195,116 28
24. For wooden bridges, per last report,	5,500 00	
25. For wooden bridges, paid during the past year,	217 71	
26. Total amount expended for wooden bridges,		5,717 71
27. Total amount expended for iron bridges, (if any,)	None.	
28. For superstructure, including iron, per last report,	190,120 00	
29. For superstructure, including iron, paid during the past year,	48,896 90	
30. Total amount expended for superstructure, including iron,		239,016 90
31. For stations, buildings and fixtures, per last report,	8,794 25	
32. For stations, buildings and fixtures, paid during the past year,	23,501 88	

96 MANSFIELD AND FRAMINGHAM RAILROAD. [Jan.

33. Total amount expended for stations, buildings and fixtures,		\$27,296 13
34. For land, land-damages and fences, per last report,	\$58,171 21	
35. For land, land-damages and fences, paid during the past year,	19,759 36	
36. Total amount expended for land, land-damages and fences,		77,930 57
37. For locomotives, per last report,	-	-
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,	-	-
40. For passenger and baggage cars, per last report,	-	-
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,	-	-
43. For merchandise cars, per last report,	-	-
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,	-	-
46. For engineering, per last report,	5,268 65	
47. For engineering paid during the past year,	1,007 71	
48. Total amount expended for engineering,		6,276 36
49. For agencies and other expenses, per last report,	5,020 26	
50. For agencies and other expenses, paid during the past year,	23,211 11	
51. Total amount expended for agencies and other expenses,		28,231 37
52. Amounts of discounts or other sacrifices on stock and bonds issued,	58,600 00	
53. Total cost of road and equipment,		638,185 32
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, \$1,451.92; stocks and bonds, \$13,000; real estate,; fuel,	15,451 92	
55. Income expended in construction and equipment,	-	-
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	22 11-100 miles.	
57. Length of main road in other States, (specifying how much in each,)	-	-
58. Length of single main track,	22 11-100 miles.	
59. Length of double main track,	-	-
60. Length of branches owned by the Company, stating whether they have a single or double track, and specifying length in this State, and in each other State,)	-	-
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	3,000 feet.	
62. Length of roads belonging to other companies operated by this Company,	-	-
63. Total miles of road operated by this Company,	Leased to B C. & F.	
64. Weight of rail, per yard, in main road,	50 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	-	-
66. Maximum grade, with its length, in main road,	52 8-10, 10,000 ft.	
67. Maximum grade, with its length, in branch roads,	-	-
68. Total rise and fall in main road,	585 ft.	
69. Total rise and fall in branch roads,	-	-
70. Shortest radius of curvature, with length of curve, in main road,	717 for 303 ft.	
71. Shortest radius of curvature, with length of curve, in branch roads,	-	-
72. Total degrees of curvature in main road,	753° 14'	

73. Total degrees of curvature in branch roads, . . .	-	-
74. Total length of straight line in main road, . . .	15 11-100 miles.	
75. Total length of straight line in branches, . . .	-	-
76. Aggregate length of wooden truss bridges, . . .	165 feet.	
77. Aggregate length of all other wooden bridges, . . .	19 feet.	
78. Aggregate length of iron bridges, . . .	-	-
79. Whole length of road unfenced on both sides, . . .	None.	
80. Number of public ways crossed at grade, . . .	31	
81. Number of railroads crossed at grade, . . .	3	
82. Remarks, . . .	-	-
83. Way stations for express trains, . . .	-	-
84. Way stations for accommodation trains, . . .	6	
85. Flag stations, . . .	1	
86. Whole number of way stations, . . .	6	
87. Whole number of flag stations, . . .	1	

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains, . . .	
89. Miles run by freight trains, . . .	
90. Miles run by other trains, . . .	
91. Total miles run, . . .	
92. Number of passengers carried in the cars, . . .	
93. Number of passengers carried one mile, . . .	
94. Number of tons of merchandise carried in the cars, . . .	
95. Number of tons of merchandise carried one mile, . . .	
96. Number of passengers carried one mile, to and from other roads, . . .	
97. Number of tons carried one mile, to and from other roads, . . .	
98. Rate of speed adopted for express passenger trains, including stops, . . .	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions, . . .	
100. Rate of speed adopted for accommodation trains, . . .	
101. Rate of speed actually attained by accommodation trains, including stops and detentions, . . .	
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	
103. Average rate of speed adopted for freight trains, including stops, . . .	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile, . . .	
105. Estimated weight in tons of merchandise cars (not including freight,) hauled one mile, . . .	

Road went into complete operation May 1, 1870. Leased and operated by Boston, Clinton and Fitchburg R. R.

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron, . . .	
107. For repairs of wooden bridges, . . .	
108. For wages of switchmen, average per month, . . . \$	
109. For wages of gate-keepers, average per month, . . .	
110. For wages of signal-men, average per month, . . .	
111. For wages of watchmen, average per month, . . .	

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

112. Number of men employed, exclusive of those engaged in construction,	} Leased and operated by Boston, Clinton and Fitchburg R. R.
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,	
115. Total for maintenance of way,	

MOTIVE POWER AND CARS.

116. For repairs of locomotives,	} None.
117. For new locomotives, to cover depreciation,	
118. For repairs of passenger cars,	
119. For new passenger cars, to cover depreciation,	
120. For repairs of merchandise cars,	
121. For new merchandise cars, to cover depreciation,	
122. For repairs of gravel and other cars,	
123. Total for maintenance of motive power and cars,	
124. Number of engines,	
125. Number of passenger cars,	
126. Number of baggage cars,	
127. Number of merchandise cars,	
128. Number of gravel cars,	

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz. :—	} Answered by B. C. & F.
1. Wood, No. of cords, Cost of the same,	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) Cost of same,	
130. For oil used by cars and engines,	
131. For waste and other material for cleaning,	
132. For salaries, wages and incidental expenses, chargeable to passenger department,	
133. For salaries, wages and incidental expenses, chargeable to freight department,	
134. For gratuities and damages,	
135. For taxes and insurance,	
136. For ferries,	
137. For repairs of station buildings, aqueducts, fixtures, furniture,	
138. For renewals of iron, including laying down,	
139. For new iron laid down, deducting the value of old iron taken up,	
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	
141. For amount paid other companies, as rent for use of their roads, specifying each company,	
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	
143. Total miscellaneous,	
144. Total expenditures for working the road,	
145. Total amount of interest paid during the year,	

* See note on preceding page.

INCOME DURING THE YEAR.*		
146. For Passengers :—		
1. On main road, including branches owned by company,	-	-
2. To and from other roads, specifying what,	-	-
147. For Freight:—		
1. On main road and branches owned by Co.,	-	-
2. To and from other connecting roads,	-	-
148. U. S. mails,	-	-
149. Rents,	-	-
150. Total income,		\$9,257 70
151. Net earnings, after deducting expenses,		-
[Interest on bonds and floating debt,]	\$21,868 15	
DIVIDENDS.		
152. per cent. Total,	-	-
153. Surplus not divided,	-	-
154. Surplus last year,	-	-
155. Total surplus; cash and loans,		
stocks and bonds,		
fuel,	-	-
ESTIMATED DEPRECIATION BEYOND THE RENEWALS,		
VIZ. :		
156. Of road and bridges,	-	-
157. Buildings,	-	-
158. Engines and cars,	-	-
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage, of road and franchise or any property of the corporation, per last report,	\$146,500 00	
160. Mortgage debt paid since last report,	None.	
161. Increase of mortgage debt since last report,	153,500 00	
162. Present amount of mortgage debts,	300,000 00	
163. Number of mortgages, on road and franchise or any property of the corporation,	One.	

GEO. E. TOWNE,
JNO. HENRY ELLIOT,
LYMAN NICHOLS,
H. A. BLOOD,
H. N. BIGELOW,
OTIS CARY,
GEO. A. TORREY,

Directors of the Mansfield and Framingham Railroad Company.

SUFFOLK, ss. November 15, 1870. Then personally appeared Geo. E. Towne, J. H. Elliot and Lyman Nichols and Geo. A. Torrey, and severally made oath to the truth of the foregoing statement by them subscribed.
Before H. A. BLOOD, Justice of the Peace.

WORCESTER, ss. November 17, 1870. Then personally appeared Otis Cary and H. A. Blood, and severally made oath to the truth of the foregoing statement by them subscribed.
Before E. D. HEWINS, Justice of the Peace.

REPORT
OF THE
MASSACHUSETTS CENTRAL RAILROAD CORPORATION,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$6,000,000 00	
2. Number of shares of capital stock issued,	None.		
3. Increase of capital since last report,	None.		
4. Capital paid in, per last report,	None.		
5. Capital paid in since last report,	None.		
6. Total amount of capital stock paid in,	None.		
7. Amount realized in cash value for stock issued,	None.		
8. Funded debt, per last report,	None.		
9. Funded debt paid since last report,	None.		
10. Funded debt, increase of, since last report,	None.		
11. Total present amount of funded debt,	None.		
12. Floating debt, per last report,	None.		
13. Floating debt paid since last report,	None.		
14. Floating debt, increase of, since last report,	\$5,900 00		
15. Total present amount of floating debt,		5,900 00	
16. Total present amount of funded and floating debt,		5,900 00	
17. Whole amount in cash value realized from funded and floating debts,	5,900 00		
18. Whole amount in cash value realized from stock and debts,	5,900 00		
19. Average rate of interest per annum paid during the year,	Six per cent.		
20. Maximum amount of debts during the year,	5,900 00		
47. For engineering, paid during the past year,	\$2,838 21		
48. Total amount expended for engineering,		\$2,838 21	
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	\$2,599 25		
143. Total miscellaneous,		\$2,599 25	

JAMES M. STONE,
JOEL HAYDEN,
FRANCIS BRIGHAM,
HIRAM WADSWORTH,
B. H. TRIPP,
E. B. SHATTUCK,
J. EDWIN SMITH,
HENRY F. HILLS,
CHAS. A. CUTTING,
JAMES S. DRAPER,
LEWIS J. DUDLEY,
Directors of the Massachusetts Central Railroad Corporation.

SUFFOLK, ss. November 16, 1870. Then personally appeared James M. Stone, Joel Hayden, Francis Brigham, Hiram Wadsworth, B. H. Tripp, E. B. Shattuck, J. Edwin Smith, Henry F. Hills, Chas. A. Cutting and James S. Draper, and severally made oath to the truth of the foregoing statement by them subscribed.

Before me,

J. L. ENGLISH, *Justice of the Peace.*

SUFFOLK, ss. November 17, 1870. Then personally appeared L. J. Dudley, and made oath to the truth of the foregoing statement by him subscribed.

Before me,

J. L. ENGLISH, *Justice of the Peace.*

R E P O R T

OF THE

MIDDLEBOROUGH AND TAUNTON R. R. CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$150,000 00
2. Number of shares of capital stock issued,	1,472	
3. Increase of capital since last report,	—	—
4. Capital paid in, per last report,	\$149,092 40	
5. Capital paid in since last report,	—	—
6. Total amount of capital stock paid in,		149,092 40
7. Amount realized in cash value for stock issued,	148,075 00	
8. Funded debt, per last report,	—	—
9. Funded debt paid since last report,	—	—
10. Funded debt, increase of, since last report,	—	—
11. Total present amount of funded debt,	—	—
12. Floating debt, per last report,	28 03	
13. Floating debt paid since last report,	—	—
14. Floating debt, increase of, since last report,	224 65	
15. Total present amount of floating debt,		252 68
16. Total present amount of funded and floating debt,	—	—
17. Whole amount in cash value realized from funded and floating debts,	252 68	
18. Whole amount in cash value realized from stock and debts,	148,327 68	
19. Average rate of interest per annum paid during the year,	—	—
20. Maximum amount of debts during the year,	734 73	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$45,899 14	
22. For graduation and masonry paid during the past year,	None.	
23. Total amount expended for graduation and masonry,		\$45,899 14
24. For wooden bridges, per last report,	384 15	
25. For wooden bridges paid during the past year,	None.	
26. Total amount expended for wooden bridges,		384 15
27. Total amount expended for iron bridges, (if any,)	None.	
28. For superstructure, including iron, per last report,	56,283 85	
29. For superstructure, including iron, paid during the past year,	1,450 00	
30. Total amount expended for superstructure, including iron,		57,733 85
31. For stations, buildings and fixtures, per last report,	3,991 29	
32. For stations, buildings and fixtures paid during the past year,	None.	

33. Total amount expended for stations, buildings and fixtures,		\$8,991 29
34. For land, land-damages and fences, per last report,	\$18,066 07	
35. For land, land-damages and fences paid during the past year,	None.	
36. Total amount expended for land, land-damages, and fences,		18,066 07
37. For locomotives, per last report,	7,656 29	
38. For locomotives paid during the past year,	None.	
39. Total amount expended for locomotives,		7,656 29
40. For passenger and baggage cars, per last report,	2,577 43	
41. For passenger and baggage cars paid during the past year,	None.	
42. Total amount expended for passenger and baggage cars,		2,577 43
43. For merchandise cars, per last report,	9,134 69	
44. For merchandise cars paid during the past year,	5,530 05	
45. Total amount expended for merchandise cars,		14,664 74
46. For engineering, per last report,	4,147 29	
47. For engineering paid during the past year,	None.	
48. Total amount expended for engineering,		4,147 29
49. For agencies and other expenses, per last report,	4,699 14	
50. For agencies and other expenses, paid during the past year,	None.	
51. Total amount expended for agencies and other expenses,		4,699 14
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,		159,819 39
54. Amount of assets or property held by the corporation in addition to the cost of the road; [accounts,] cash and loans, [&c.,] \$10,326.03; stocks and bonds,; real estate, \$1,696.68; fuel,	12,022 71	
55. Income expended in construction and equipment,	11,744 39	

CHARACTERISTICS OF ROAD.

56. Length of main road in this State,	8 536-1,000 miles.
57. Length of main road in other States, (specifying how much in each,)	None.
58. Length of single main track,	8 536-1,000 miles.
59. Length of double main track,	None.
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	None.
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	2,955 ft.
62. Length of roads belonging to other companies operated by this Company,	None.
63. Total miles of road operated by this Company,	8 536-1,000 miles.
64. Weight of rail, per yard, in main road,	49 lbs.
65. Weight of rail, per yard, in branch roads (specify the different weights per yard,)	None.
66. Maximum grade, with its length, in main road,	42 feet, 4,280 ft.
67. Maximum grade, with its length, in branch roads,	None,
68. Total rise and fall in main road,	184 feet.
69. Total rise and fall in branch roads,	None.
70. Shortest radius of curvature, with length of curve, in main road,	860 feet, 1,174 feet.
71. Shortest radius of curvature, with length of curve, in branch roads,	None.

72. Total degrees of curvature in main road, . . .	50°	
73. Total degrees of curvature in branch roads, . . .	None.	
74. Total length of straight line in main road, . . .	37,310 feet.	
75. Total length of straight line in branches, . . .	None.	
76. Aggregate length of wooden truss bridges, . . .	} No bridges.	
77. Aggregate length of all other wooden bridges, . . .		
78. Aggregate length of iron bridges, . . .		
79. Whole length of road unfenced on both sides, . . .	900 feet.	
80. Number of public ways crossed at grade, . . .	11	
81. Number of railroads crossed at grade, . . .	None.	
82. Remarks,	None.	
83. Way stations for express trains,	None.	
84. Way stations for accommodation trains,	1	
85. Flag stations,	3	
86. Whole number of way stations,	1	
87. Whole number of flag stations,	3	
DOINGS DURING THE YEAR.*		
88. Miles run by passenger trains,	11,756	
89. Miles run by freight trains,	6,003	
90. Miles run by other trains,	33	
91. Total miles run,		17,791
92. Number of passengers carried in the cars,	31,460	
93. Number of passengers carried one mile,	214,339	
94. Number of tons of merchandise carried in the cars,	22,001	732-2,000
95. Number of tons of merchandise carried one mile,	113,113	1,235-2,000
96. Number of passengers carried one mile, to and from other roads,	201,559	
97. Number of tons carried one mile, to and from other roads,	109,501	
98. Rate of speed adopted for express passenger trains, including stops,	} No express trains.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,		
100. Rate of speed adopted for accommodation trains,	25 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	25 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	No special trains.	
103. Average rate of speed adopted for freight trains, including stops,	14 miles per hour.	
104. Estimated weight, in tons, of passenger cars, (not including passengers,) hauled one mile,	185,640	
105. Estimated weight, in tons, of merchandise cars, (not including freight,) hauled one mile,	597,120	
EXPENDITURES FOR WORKING THE ROAD.*		
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$5,405 03	
107. For repairs of wooden bridges,	-	
108. For wages of switchmen, average per month, \$35 00	} Total,	
109. For wages of gate-keepers, average per month,		
110. For wages of signal-men, average per month,		350 00
111. For wages of watchmen, average per month,		

* All items under the headings marked with an asterisk, are required by law for " the total miles of road operated by this company."

112. Number of men employed, exclusive of those engaged in construction,	15		
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)		\$34 00	
114. For repairs of fences, gates, houses for signalmen, gate-keepers, switchmen, tool-houses,		225 57	
115. Total for maintenance of way,			\$6,014 60

MOTIVE POWER AND CARS.

116. For repairs of locomotives,		\$799 79	
117. For new locomotives, to cover depreciation,		-	-
118. For repairs of passenger cars,		616 76	
119. For new passenger cars, to cover depreciation,		-	-
120. For repairs of merchandise cars,		255 96	
121. For new merchandise cars, to cover depreciation,		-	-
122. For repairs of gravel and other cars,		-	-
123. Total for maintenance of motive power and cars,			\$1,672 51
124. Number of engines,	1		
125. Number of passenger cars,	2		
126. Number of baggage cars,	1		
127. Number of merchandise cars,	28		
128. Number of gravel cars,	None.		

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz.:—			
1. Wood, number of cords, Cost of the same,	}	\$2,964 94	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) Cost of same,			
130. For oil used by cars and engines,		372 80	
131. For waste and other material for cleaning,		-	-
132. For salaries, wages and incidental expenses, chargeable to passenger department,		2,761 01	
133. For salaries, wages and incidental expenses, chargeable to freight department,		4,049 84	
134. For gratuities and damages,		145 40	
135. For taxes and insurance,		642 60	
136. For ferries,		-	-
137. For repairs of station buildings, aqueducts, fixtures, furniture,		890 96	
138. For renewals of iron, including laying down,		-	-
139. For new iron laid down, deducting the value of old iron taken up,		-	-
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,		-	-
141. For amount paid other companies, as rent for use of their roads, specifying each company,		-	-
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,		2,196 87	
143. Total miscellaneous,			\$14,024 42
144. Total expenditures for working the road,			21,711 53
145. Total amount of interest paid during the year,		-	-

INCOME DURING THE YEAR.*

146. For Passengers:—			
1. On main road, including branches owned by Company,		\$522 90	\$10,392 70
2. To and from other roads, specifying what,		9,869 80	

* See note on preceding page.

147. For Freight :—			
1. On main road and branches owned by Company,	\$365 99	} \$14,914 12	
2. To and from other connecting roads,	14,548 13		
148. U. S. mails,	225 00		
149. Rents, [interest,]	188 94		
150. Total income,			25,720 76
151. Net earnings, after deducting expenses,	4,009 23		
DIVIDENDS.			
152. 2 per cent. Total,			\$2,944 00
153. Surplus not divided,	\$1,065 23		
154. Surplus last year,	22,449 19		
155. Total surplus,			23,514 42
[account,] cash and loans, \$10,326.03 ; stocks and bonds, ; real estate, \$1,696.68 ; fuel, [Less debts,]			
	12,022 71		
	252 68		
			11,770 03
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ.:—			
156. Of road and bridges,		} None.	
157. Buildings,			
158. Engines and cars,			
MORTGAGE DEBTS.			
159. Amount of debts secured by mortgage, of road and franchise or any property of the Corporation, per last report,		} None.	
160. Mortgage debt paid since last report,			
161. Increase of mortgage debt since last report,			
162. Present amount of mortgage debts,			
163. Number of mortgages, on road and franchise or any property of the Corporation,			

ELISHA TUCKER,
O. A. WASHBURN, JR.,
CHAS. ROBINSON,
JOSEPH S. TILLINGHAST,

Directors of the Middleborough and Taunton Railroad Corporation.

SUFFOLK, ss. October 28, 1870. Then personally appeared J. S. Tillinghast, and affirmed, and Elisha Tucker, Charles Robinson and O. A. Washburn, Jr., and severally made oath to the truth of the foregoing statement by them subscribed.

Before

E. PICKERING, Justice of the Peace.

REPORT

OF THE

MILFORD AND WOONSOCKET RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$100,000 00
2. Number of shares of capital stock issued,	775	
3. Increase of capital since last report,	—	—
4. Capital paid in, per last report,	\$82,250 00	
5. Capital paid in since last report,	—	—
6. Total amount of capital stock paid in,		82,250 00
7. Amount realized in cash value for stock issued,	82,250 00	
8. Funded debt, per last report,	—	—
9. Funded debt paid since last report,	—	—
10. Funded debt, increase of, since last report,	—	—
11. Total present amount of funded debt,	—	—
12. Floating debt, per last report,	30,000 00	
13. Floating debt paid since last report,	500 00	
14. Floating debt, increase of, since last report,	—	—
15. Total present amount of floating debt,		29,500 00
16. Total present amount of funded and floating debt,		29,500 00
17. Whole amount in cash value realized from funded and floating debts,	29,500 00	
18. Whole amount in cash value realized from stock and debts,	111,750 00	
19. Average rate of interest per annum, paid during the year,	7 per cent.	
20. Maximum amount of debts during the year,	30,500 00	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry per last report,	\$2,337 69	
22. For graduation and masonry paid during the past year,	409 69	
23. Total amount expended for graduation and masonry,		\$2,747 38 for 22 mos.
24. For wooden bridges, per last report,	} For Nos. 21, 24 and 28, \$34,702.11.	
25. For wooden bridges paid during the past year,		
26. Total amount expended for wooden bridges,		
27. Total amount expended for iron bridges, (if any,)		
28. For superstructure, including iron, per last report,	}	
29. For superstructure, including iron, paid during the past year,		
30. Total amount expended for superstructure, including iron,		
31. For stations, buildings and fixtures, per last report,	\$11,875 52	
32. For stations, buildings and fixtures, paid during the past year,	—	—
33. Total amount expended for stations, buildings and fixtures,		\$11,875 52

34. For land, land-damages and fences, per last report,	\$9,408 03	
35. For land, land-damages and fences, paid during the past year,	-	-
36. Total amount expended for land, land-damages, and fences,		\$9,408 03
37. For locomotives, per last report,	-	-
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,	-	-
40. For passenger and baggage cars, per last report,	-	-
41. For passenger and baggage cars paid during the past year,		-
42. Total amount expended for passenger and baggage cars,	-	-
43. For merchandise cars, per last report,	-	-
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,	-	-
46. For engineering, per last report,	4,896 27	
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		4,896 27
49. For agencies and other expenses, per last report,	2,959 82	
50. For agencies and other expenses, paid during the past year,	39 50	
51. Total amount expended for agencies and other expenses,		2,998 82
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,		116,628 13
54. Amount of assets or property held by the corporation in addition to the cost of the road; cash and loans, \$496.05; stocks and bonds,		
; real estate,	496 05	
; fuel,	449 19	
55. Income expended in construction and equipment,		

CHARACTERISTICS OF ROAD.

56. Length of main road in this State,	3.877 miles.	
57. Length of main road in other States, (specifying how much in each,)	-	-
58. Length of single main track,	3.877 miles.	
59. Length of double main track,	-	-
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	-	-
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	0.459 miles.	
62. Length of roads belonging to other companies operated by this Company,	-	-
63. Total miles of road operated by this Company,	-	-
64. Weight of rail, per yard, in main road,	56 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	-	-
66. Maximum grade, with its length, in main road,	38 ft. for 2,500 ft.	
67. Maximum grade, with its length, in branch roads,	-	-
68. Total rise and fall in main road,	75.04 ft.	
69. Total rise and fall in branch roads,	-	
70. Shortest radius of curvature, with length of curve, in main road,	619 ft. for 366 ft.	
71. Shortest radius of curvature, with length of curve, in branch roads,	-	-
72. Total degrees of curvature in main road,	167° 47'	
73. Total degrees of curvature in branch roads,	-	-
74. Total length of straight line in main road,	2.949 miles.	

75. Total length of straight line in branches, . . .	—	—
76. Aggregate length of wooden truss bridges, . . .	—	—
77. Aggregate length of all other wooden bridges, . . .	170 feet.	
78. Aggregate length of iron bridges, . . .	—	—
79. Whole length of road unfenced on both sides, . . .	$\frac{1}{2}$ mile.	
80. Number of public ways crossed at grade, . . .	8	
81. Number of railroads crossed at grade, . . .	—	—
82. Remarks, . . .	—	—
83. Way stations for express trains, . . .	—	—
84. Way stations for accommodation trains, . . .	1	
85. Flag stations, . . .	1	
86. Whole number of way stations, . . .	1	
87. Whole number of flag stations, . . .	1	

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains, . . .	
89. Miles run by freight trains, . . .	
90. Miles run by other trains, . . .	
91. Total miles run, . . .	
92. Number of passengers carried in the cars, . . .	
93. Number of passengers carried one mile, . . .	
94. Number of tons of merchandise carried in the cars, . . .	
95. Number of tons of merchandise carried one mile, . . .	
96. Number of passengers carried one mile to and from other roads, . . .	
97. Number of tons carried one mile to and from other roads, . . .	
98. Rate of speed adopted for express passenger trains, including stops, . . .	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions, . . .	
100. Rate of speed adopted for accommodation trains, . . .	
101. Rate of speed actually attained by accommodation trains, including stops and detentions, . . .	
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	
103. Average rate of speed adopted for freight trains, including stops, . . .	
104. Estimated weight, in tons, of passenger cars (not including passengers) hauled one mile, . . .	
105. Estimated weight, in tons, of merchandise cars, (not including freight) hauled one mile, . . .	

This road is leased to the Providence and Worcester R. R. Co. for five years, May 1st, 1868.

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges and renewals of iron, . . .	
107. For repairs of wooden bridges, . . .	
108. For wages of switchmen, average per month, . . . \$	
109. For wages of gate-keepers, average per month, . . .	
110. For wages of signal-men, average per month, . . .	
111. For wages of watchmen, average per month, . . .	
112. Number of men employed, exclusive of those engaged in construction, . . .	

* All items under the headings marked with an asterisk, are required by law for " the total miles of road operated by this company."

113. For removing ice and snow (this item to include all labor, tools, repairs, and extra steam-power used,)
 114. For repairs of fences, gates, houses for signalmen, gate-keepers, switchmen, tool-houses, . . .
 115. Total for maintenance of way,

MOTIVE POWER AND CARS.

116. For repairs of locomotives,
 117. For new locomotives, to cover depreciation, . . .
 118. For repairs of passenger cars,
 119. For new passenger cars, to cover depreciation, . . .
 120. For repairs of merchandise cars,
 121. For new merchandise cars, to cover depreciation, . . .
 122. For repairs of gravel and other cars,
 123. Total for maintenance of motive power and cars, . . .
 124. Number of engines,
 125. Number of passenger cars,
 126. Number of baggage cars,
 127. Number of merchandise cars,
 128. Number of gravel cars,

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz. :—
 1. Wood, No. of cords, . . . Cost of the same,
 2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) . . . Cost of same,
 130. For oil used by cars and engines,
 131. For waste and other material for cleaning,
 132. For salaries, wages and incidental expenses, chargeable to passenger department,
 133. For salaries, wages and incidental expenses, chargeable to freight department,
 134. For gratuities and damages,
 135. For taxes and insurance,
 136. For ferries,
 137. For repairs of station buildings, aqueducts, fixtures, furniture,
 138. For renewals of iron, including laying down,
 139. For new iron laid down, deducting the value of old iron taken up,
 140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,
 141. For amount paid other companies as rent for use of their roads, specifying each company,
 142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,
 143. Total miscellaneous,
 144. Total expenditures for working the road,
 145. Total amount of interest paid during the year,

This road is leased to the Providence and Worcester R. R. Co. for five years, May 1st, 1868.

\$1,339 87

INCOME DURING THE YEAR.*

146. For Passengers :—
 1. On main road, including branches owned by company,
 2. To and from other roads, specifying what,

* See note on preceding page.

147. For Freight :—

1. On main road and branches owned by Co.,	-	-
2. To and from other connecting roads, . . .	-	-
148. U. S. mails,	-	-
149. Rents,	\$2,500 for 6 mos.	
150. Total income,		\$2,500 00
151. Net earnings, after deducting expenses, . . .	\$720 94	

DIVIDENDS.

152. per cent. Total,	-	-
153. Surplus not divided,	-	-
154. Surplus last year,	-	-
155. Total surplus; cash and loans, stocks and bonds, ; real estate, ; fuel,	-	-

**ESTIMATED DEPRECIATION BEYOND THE RENEWALS,
VIZ. :—**

156. Of road and bridges,	-	-
157. Buildings,	-	-
158. Engines and cars,	-	-

MORTGAGE DEBTS.

159. Amount of debts, secured by mortgage of road and franchise or any property of the corpora- tion, per last report,	-	-
160. Mortgage debt, paid since last report,	-	-
161. Increase of mortgage debt, since last report, .	-	-
162. Present amount of mortgage debts,	-	-
163. Number of mortgages, on road and franchise or any property of the corporation,	-	-

A. C. MAYHEW,
ELBRIDGE MANN,
A. C. FAY,
SAM'L WALKER,
GEORGE DRAPER,

Directors of the Milford and Woonsocket Railroad Corporation.

STATE OF MASSACHUSETTS.

COUNTY OF WORCESTER, ss. October 31, 1870. Then personally appeared A. C. Mayhew, Elbridge Mann, A. C. Fay, Samuel Walker and George Draper, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

N. B. JOHNSON, *Notary Public.*

R E P O R T

OF THE

NASHUA AND LOWELL RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$750,000 00
2. Number of shares of capital stock issued,	7,200	
3. Increase of capital since last report,	None.	
4. Capital paid in, per last report,	\$720,000 00	
5. Capital paid in since last report,	None.	
6. Total amount of capital stock paid in,		720,000 00
7. Amount realized in cash value for stock issued,	720,000 00	
8. Funded debt, per last report,	None.	
9. Funded debt paid since last report,	None.	
10. Funded debt, increase of, since last report,	None.	
11. Total present amount of funded debt,	None.	
12. Floating debt, per last report,	None.	
13. Floating debt paid since last report,	None.	
14. Floating debt, increase of, since last report,	None.	
15. Total present amount of floating debt,	None.	
16. Total present amount of funded and floating debt,	None.	
17. Whole amount in cash value realized from funded and floating debts,	{ This corporation has no debt.	
18. Whole amount in cash value realized from stock and debts,	720,000 00	
19. Average rate of interest per annum, paid during the year,	None.	
20. Maximum amount of debts during the year,	Nothing.	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$117,339 28	
22. For graduation and masonry paid during the past year,	None.	
23. Total am't expended for graduation and masonry,		\$117,339 28
24. For wooden bridges, per last report,	10,030 35	
25. For wooden bridges paid during the past year,	None.	
26. Total amount expended for wooden bridges,		10,030 35
27. Total amount expended for iron bridges (if any,)		1,875 00
28. For superstructure, including iron, per last report,	267,582 39	
29. For superstructure, including iron, paid during the past year,	None.	
30. Total amount expended for superstructure, including iron,		267,582 39
31. For stations, buildings and fixtures, per last report,	111,765 05	
32. For stations, buildings and fixtures paid during the past year,	None.	

33. Total amount expended for stations, buildings and fixtures,		\$111,765 05
34. For land, land-damages and fences, per last report,	\$98,196 95	
35. For land, land-damages and fences paid during the past year,	None.	
36. Total amount expended for land, land-damages, and fences,		98,196 95
37. For locomotives, per last report,	53,000 00	
38. For locomotives paid during the past year,	None.	
39. Total amount expended for locomotives,		53,000 00
40. For passenger and baggage cars, per last report,	19,300 00	
41. For passenger and baggage cars paid during the past year,	None.	
42. Total amount expended for passenger and baggage cars,		19,300 00
43. For merchandise cars, per last report,	41,106 16	
44. For merchandise cars paid during the past year,	None.	
45. Total amount expended for merchandise cars,		41,106 16
46. For engineering, per last report,	22,516 65	
47. For engineering paid during the past year,	None.	
48. Total amount expended for engineering,		22,516 65
49. For agencies and other expenses, per last report,	None.	
50. For agencies and other expenses, paid during the past year,	None.	
51. Total amount expended for agencies and other expenses,	None.	
52. Amounts of discounts or other sacrifices on stock and bonds issued,	None.	
53. Total cost of road and equipment,		737,705 83
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, \$78,674.96; stocks and bonds, [Nothing;] real estate,; fuel, [and working materials,] \$57,982 46,	126,747 42	
55. Income expended in construction and equipment,	17,705 83	
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	45,783 2-10 feet.	
57. Length of main road in other States, (specifying how much in each,)	28,217 feet.	
58. Length of single main track,	None.	
59. Length of double main track,	14½ miles, 444 2-10 feet.	
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	None.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	3 miles.	
62. Length of roads belonging to other companies operated by this Company,	28 66-100 miles.	
63. Total miles of road operated by this Company,	43 miles, 770 2-10 feet.	
64. Weight of rail, per yard, in main road,	56 to 60 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	None.	
66. Maximum grade, with its length, in main road,	12 7-10 per mile, 4,133 ft.	
67. Maximum grade, with its length, in branch roads,	None.	
68. Total rise and fall in main road,	73 5-10 feet.	
69. Total rise and fall in branch roads,	None.	
70. Shortest radius of curvature, with length of curve, in main road,	636'; 100 feet long.	
71. Shortest radius of curvature, with length of curve, in branch roads,	None.	

72. Total degrees of curvature in main road, . . .	770
73. Total degrees of curvature in branch roads, . . .	None,
74. Total length of straight line in main road, . . .	7 22-100 miles.
75. Total length of straight line in branches, . . .	None.
76. Aggregate length of wooden truss bridges, . . .	530 feet.
77. Aggregate length of all other wooden bridges, . . .	664 feet.
78. Aggregate length of iron bridges, . . .	160 feet.
79. Whole length of road unfenced on both sides, . . .	None.
80. Number of public ways crossed at grade, . . .	8
81. Number of railroads crossed at grade, . . .	1
82. Remarks,	-
83. Way stations for express trains,	None.
84. Way stations for accommodation trains,	6
85. Flag stations,	None.
86. Whole number of way stations,	6
87. Whole number of flag stations,	None.

DOINGS DURING THE YEAR.* [10 Mos.]

[Including our proportion of Wilton, Stony Brook, Salem and Lowell, Lowell and Lawrence, and Stoneham Branch Railroads.]

88. Miles run by passenger trains,	119,002	
89. Miles run by freight trains,	105,936	
90. Miles run by other trains,	Included above.	
91.* Total miles run,		224,938
92. Number of passengers carried in the cars,	568,527	
93. Number of passenger carried one mile,	7,499,849	
94. Number of tons of merchandise carried in the cars,	194,361	
95. Number of tons of merchandise carried one mile,	5,191,427	
96. Number of passengers carried one mile, to and from other roads,	1,824,762	
97. Number of tons carried one mile, to and from other roads,	3,298 853	
98. Rate of speed adopted for express passenger trains, including stops,	30 miles per hour.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	30 miles per hour.	
100. Rate of speed adopted for accommodation trains,	25 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	25 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	25 miles per hour.	
103. Average rate of speed adopted for freight trains, including stops,	10 miles per hour.	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile,	3,749,924 tons.	
105. Estimated weight in tons of merchandise cars (not including freight,) hauled one mile,	7,787,140 tons.	

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$43,075 87
107. For repairs of wooden bridges,	5,254 68

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

108. For wages of switchmen, average per month,	\$45 00	} Total,	\$9,190 01
109. For wages of gate-keepers, average per month,	35 00		
110. For wages of signal-men, average per month,	35 00		
111. For wages of watchmen, average per month,	45 00		
112. Number of men employed, exclusive of those engaged in construction,			257
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)			\$937 57
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses, [and freight houses,]			13,680 84
115. Total for maintenance of way,			72,188 97

MOTIVE POWER AND CARS.

116. For repairs of locomotives,	\$12,541 23	
117. For new locomotives, to cover depreciation,	4,526 00	
118. For repairs of passenger cars,	8,222 32	
119. For new passenger cars, to cover depreciation,	5,249 73	
120. For repairs of merchandise cars,	11,527 49	
121. For new merchandise cars, to cover depreciation,	8,341 83	
122. For repairs of gravel and other cars,	Included above.	
[For repairs of tools and machinery,]		
123. Total for maintenance of motive power and cars,		\$50,408 60
124. Number of engines,	14	
125. Number of passenger cars,	17	
126. Number of baggage cars,	8	
127. Number of merchandise cars,	247	
128. Number of gravel cars,	103	

MISCELLANEOUS.*

[Fuel used for sundry purposes,]	\$4,654 12	
129. For fuel used by engines during the year, viz. :—		
1. Wood, number of cords, 2,554. Cost of the same,	14,002 96	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 2,944. Cost of same,	22,906 47	
130. For oil used by cars and engines,	2,585 96	
131. For waste and other material for cleaning,	3,878 94	
132. For salaries, wages and incidental expenses, chargeable to passenger department,	23,387 43	
133. For salaries, wages and incidental expenses, chargeable to freight department,	46,774 84	
134. For gratuities and damages,	5,439 43	
135. For taxes and insurance, [including U. S. taxes,]	28,598 99	
136. For ferries,	Nothing.	
137. For repairs of station buildings, aqueducts, fixtures, furniture,	5,268 97	
138. For renewals of iron, including laying down,	} 10,089 04	
139. For new iron laid down, deducting the value of old iron taken up,		
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,		Nothing.

* See note on preceding page.

141. For amount paid other companies, as rent for use of their roads, specifying each company,† .	\$29,094 56	
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	9,428 18	
143. Total miscellaneous,		\$206,059 88
144. Total expenditures for working the road,		328,507 45
145. Total amount of interest paid during the year, [for renewals of buildings and superstructure,]	10,000 00	
INCOME DURING THE YEAR.* [10 Mos.]		
146. <i>For Passengers</i> :—		
1. On main road, including branches owned by company,	\$145,053 89	
2. To and from other roads, specifying what,‡ .	31,317 32	
147. <i>For Freight</i> :—		
1. On main road, and branches owned by Co.,	110,695 47	
2. To and from other connecting roads,	111,674 94	
148. U. S. mails,	2,433 75	
149. Rents, [expresses, \$6,992.66 ; miscellaneous items, \$1,812.32,]	8,804 98	
150. Total income,		\$411,979 75
151. Net earnings, after deducting expenses, [and renewals,]	73,372 80	
DIVIDENDS.		
152. 5 per cent. Total,		\$36,000 00
153. Surplus not divided,	\$37,372 30	
154. Surplus last year,	89,375 12	
155. Total surplus,; cash and loans, \$68,764.96; stocks and bonds, [None;] real estate, ; fuel, [and working materials, \$57,982.46,]	126,747 42	
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—		
156. Of road and bridges,	\$15,000 00	
157. Buildings,	5,000 00	
158. Engines and cars,	—	—
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage, of road and franchise or any property of the Corporation, per last report,	} None.	
160. Mortgage debt paid since last report,		
161. Increase of mortgage debt since last report,		
162. Present amount of mortgage debts,		
163. Number of mortgages, on road and franchise or any property of the Corporation,		

ACCIDENT.

May 21, 1870.—John W. Hopkins jumped from a train in motion at North Chelmsford, receiving injuries which caused his death.

F. B. CROWNINSHIELD,
EDWARD SPALDING,
HENRY SIGOURNEY,

Directors of the Nashua and Lowell Railroad Corporation.

† Stony Brook R. R. ; Salem and Lowell R. R. ; Lowell and Lawrence R. R. ; and Wilton R. R.

‡ Worcester and Nashua R. R., and its Western connections ; Boston and Maine R. R., and its Eastern connections ; Concord R. R., and Fitchburg R. R., and their Northern connections.

STATE OF NEW HAMPSHIRE.

HILLSBOROUGH, ss. November 19, 1870. Then personally appeared Edward Spalding, and made oath to the truth of the foregoing statement by him subscribed.

Before

A. McKEAN, *Justice of the Peace.*

•

SUFFOLK, ss. November 22, 1870. Then personally appeared F. B. Crowninshield and Henry Sigourney, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

C. E. A. BARTLETT, *Justice of the Peace.*

R E P O R T

OF THE

NEW BEDFORD AND TAUNTON RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$500,000 00
2. Number of shares of capital stock issued,	5,000	
3. Increase of capital since last report,	-	-
4. Capital paid in, per last report,	\$500,000 00	
5. Capital paid in since last report,	-	-
6. Total amount of capital stock paid in,		500,000 00
7. Amount realized in cash value for stock issued,		500,000 00
8. Funded debt, per last report,	172,500 00	
9. Funded debt paid since last report,	-	-
10. Funded debt, increase of, since last report,	-	-
11. Total present amount of funded debt,		172,500 00
12. Floating debt, per last report,	-	-
13. Floating debt paid since last report,	-	-
14. Floating debt, increase of, since last report,	-	-
15. Total present amount of floating debt,	-	-
16. Total present amount of funded and floating debt,		172,500 00
17. Whole amount in cash value realized from funded and floating debts,	-	-
18. Whole amount in cash value realized from stock and debts,	-	-
19. Average rate of interest per annum paid during the year,	-	-
20. Maximum amount of debts during the year,		172,500 00
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$158,108 01	
22. For graduation and masonry paid during the past year,	-	-
23. Total am't expended for graduation and masonry,		158,108 01
24. For wooden bridges, per last report,	4,013 85	
25. For wooden bridges paid during the past year,	-	-
26. Total amount expended for wooden bridges,		4,013 85
27. Total amount expended for iron bridges, (if any,)	-	-
28. For superstructure, including iron, per last report,	118,002 39	
29. For superstructure, including iron, paid during the past year,	-	-
30. Total amount expended for superstructure, including iron,		118,002 39
31. For stations, buildings and fixtures, per last report,	45,826 98	
32. For stations, buildings and fixtures paid during the past year,	-	-

33. Total amount expended for stations, buildings and fixtures,		\$45,826 98
34. For land, land-damages and fences, per last report,	\$92,391 52	
35. For land, land-damages and fences paid during the past year,	-	-
36. Total amount expended for land, land-damages and fences,		92,391 52
37. For locomotives, per last report,	13,193 55	
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,		13,193 55
40. For passenger and baggage cars, per last report,	15,250 00	
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,		15,250 00
43. For merchandise cars, per last report,	17,575 00	
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,		17,575 00
46. For engineering, per last report,	15,693 97	
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		15,693 97
49. For agencies and other expenses, per last report,	19,944 73	
50. For agencies and other expenses paid during the past year,	-	-
51. Total amount expended for agencies and other expenses,		19,944 73
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,		500,000 00
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans,; stocks and bonds,; real estate, \$6,095.47; fuel,; [Supplies, \$10,559.98,]	16,655 45	
55. Income expended in construction and equipment,	-	-

CHARACTERISTICS OF ROAD.

56. Length of main road in this State,	20 13-100 miles.
57. Length of main road in other States, (specifying how much in each,)	-
58. Length of single main track,	20 13-100 miles.
59. Length of double main track,	-
60. Length of branches owned by the Company, stating whether they have a single or double track, and specifying length in this State, and in each other State,)	7,731 feet single, in State.
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	7,147 feet.
62. Length of roads belonging to other companies operated by this Company,	-
63. Total miles of road operated by this Company,	35 45-100 miles.
64. Weight of rail, per yard, in main road,	56 lbs.
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	56 lbs.
66. Maximum grade, with its length, in main road,	40 ft. per mile for 1½ miles.
67. Maximum grade, with its length, in branch roads,	65 ft. per mile for 600 feet.
68. Total rise and fall in main road,	861 feet.
69. Total rise and fall in branch roads,	20 feet.
70. Shortest radius of curvature, with length of curve, in main road,	1,906 feet in 1,100 feet
71. Shortest radius of curvature, with length of curve, in branch roads,	259 feet in 200 feet.

120 NEW BEDFORD AND TAUNTON RAILROAD. [Jan.

72. Total degrees of curvature in main road, . . .	160°	
73. Total degrees of curvature in branch roads, . . .	87° 45'	
74. Total length of straight line in main road, . . .	17½ miles.	
75. Total length of straight line in branches, . . .	8338 feet.	
76. Aggregate length of wooden truss bridges, . . .	-	-
77. Aggregate length of all other wooden bridges, . . .	281 feet.	
78. Aggregate length of iron bridges, . . .	-	-
79. Whole length of road unfenced on both sides, . . .	18,955 feet.	
80. Number of public ways crossed at grade, . . .	19	
81. Number of railroads crossed at grade, . . .	2	
82. Remarks,	-	-
83. Way stations for express trains, . . .	-	-
84. Way stations for accommodation trains, . . .	2	
85. Flag stations,	6	
86. Whole number of way stations, . . .	2	
87. Whole number of flag stations, . . .	6	
DOINGS DURING THE YEAR.*		
88 Miles run by passenger trains,	56,768	
89. Miles run by freight trains,	12,049	
90. Miles run by other trains,	415	
91. Total miles run,		69,232
92. Number of passengers carried in the cars, . . .	202,188	
93. Number of passengers carried one mile, . . .	2,903,432	
94. Number of tons of merchandise carried in the cars, . . .	65,640	
95. Number of tons of merchandise carried one mile, . . .	620,618	
96. Number of passengers carried one mile, to and from other roads	2,129,266	
97. Number of tons carried one mile, to and from other roads,	518,888	
98. Rate of speed adopted for express passenger trains, including stops,	30 miles per hour.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	30 miles per hour.	
100. Rate of speed adopted for accommodation trains,	24 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	24 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	-	-
103. Average rate of speed adopted for freight trains, including stops,	15 miles per hour.	
104. Estimated weight, in tons, of passenger cars (not including passengers) hauled one mile,	1,451,716	
105. Estimated weight, in tons, of merchandise cars, (not including freight) hauled one mile,	1,862,454	
EXPENDITURES FOR WORKING THE ROAD.*		
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$17,000 60	
• 107. For repairs of wooden bridges,	317 00	
108. For wages of switchmen, average per month, \$45 00		
109. For wages of gate-keepers, average per month, 12 00		
110. For wages of signal-men, average per month, 12 00		
111. For wages of watchmen, average per month, 45 00		
112. Number of men employed, exclusive of those engaged in construction,	100	
		Total, 2,446 49

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	-	-
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,	\$1,100	
115. Total for maintenance of way,		\$20,864 09

MOTIVE POWER AND CARS.

116. For repairs of locomotives,	\$9,903 54	
117. For new locomotives, to cover depreciation,	-	-
118. For repairs of passenger cars,	12,235 90	
119. For new passenger cars, to cover depreciation,	4,215 16	
120. For repairs of merchandise cars,	2,671 83	
121. For new merchandise cars, to cover depreciation,	1,164 89	
122. For repairs of gravel and other cars,	-	-
123. Total for maintenance of motive power and cars,		\$30,191 32
124. Number of engines,	5	
125. Number of passenger cars,	13	
126. Number of baggage cars,	8	
127. Number of merchandise cars,	91	
128. Number of gravel cars,	4	

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz. :—		
1. Wood, number of cords, 853. Cost of the same,	\$1,826 74	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 923. Cost of same,	8,105 36	
130. For oil used by cars and engines,	1,656 67	
131. For waste and other material for cleaning,	363 78	
132. For salaries, wages, and incidental expenses, chargeable to passenger department,	14,740 83	
133. For salaries, wages, and incidental expenses, chargeable to freight department,	12,000 05	
134. For gratuities and damages,	192 15	
135. For taxes and insurance, [including U. S. Internal Revenue,]	13,397 81	
136. For ferries,	-	-
137. For repairs of station buildings, aqueducts, fixtures, furniture,	2,029 42	
138. For renewals of iron, including laying down,	1,632 25	
139. For new iron laid down, deducting the value of old iron taken up,	9,075 84	
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	-	-
141. For amount paid other companies, as rent for use of their roads, specifying each company,	-	-
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	7,494 92	
143. Total miscellaneous,		72,515 82
144. Total expenditures for working the road,		123,571 23
145. Total amount of interest paid during the year,	-	-

* See note on preceding page.

INCOME DURING THE YEAR.*		
146. <i>For Passengers</i> :—		
1. On main road, including branches owned by company,	\$19,039 25	
2. To and from other roads, specifying what, [Taunton Br. and Old Colony R. R. Co.'s,]	85,175 84	
147. <i>For Freight</i> :—		
1. On main road, and branches owned by company,	9,460 78	
2. To and from other connecting roads,	51,899 63	
148. U. S. mails,	2,166 67	
149. Rents, [\$176.60; interest, \$919.78; earnings Fairhaven Br., \$3.06,]	1,399 44	
150. Total income,		\$169,141 61
151. Net earnings, after deducting expenses,	45,570 58	
DIVIDENDS.		
152. 8 per cent. Total,		\$40,000 00
153. Surplus not divided,	\$5,570 38	
154. Surplus last year,	118,508 04	
155. Total surplus; [paid on account purchase Fairhaven Br., \$104,071.65;] cash and loans, ; stocks and bonds, ; real estate, [\$6,095.47]; fuel, [Supplies, \$13,911.30,]		124,078 42
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—		
156. Of road and bridges,	} Nothing.	
157. Buildings,		
158. Engines and cars,		
MORTGAGE DEBTS.†		
159. Amount of debts secured by mortgage of road and franchise, or any property of the corporation, per last report,	} Nothing.	
160. Mortgage debt paid since last report,		
161. Increase of mortgage debt since last report,		
162. Present amount of mortgage debts,		
163. Number of mortgages on road and franchise, or any property of the corporation,		

FAIRHAVEN BRANCH RAILROAD.

COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$71,710 09	
22. For graduation and masonry paid during the past year,	Nothing.	
23. Total am't expended for graduation and masonry,		\$71,710 09
24. For wooden bridges, per last report,	1,073 80	
25. For wooden bridges paid during the past year,	—	—
26. Total amount expended for wooden bridges,		1,073 80
27. Total amount expended for iron bridges, (if any,)	—	—
28. For superstructure, including iron, per last report,	82,294 12	
29. For superstructure, including iron, paid during the past year,	—	—
30. Total amount expended for superstructure, including iron,		82,294 12
31. For stations, buildings and fixtures, per last report,	16,052 28	

32. For stations, buildings and fixtures, paid during the past year,	-	-
33. Total amount expended for stations, buildings and fixtures,		16,052 28
34. For land, land-damages and fences, per last report,	17,307 00	
35. For land, land-damages and fences paid during the past year,	-	-
36. Total amount expended for land, land-damages, and fences,		17,307 00
37. For locomotives, per last report,	10,000 00	
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,		10,000 00
40. For passenger and baggage cars, per last report,	7,350 00	
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,		7,350 00
43. For merchandise cars, per last report,	4,825 00	
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,		4,825 00
46. For engineering, per last report,	5,128 12	
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		5,128 12
49. For agencies and other expenses, per last report,	18,919 21	
50. For agencies and other expenses paid during the past year,	-	-
51. Total amount expended for agencies and other expenses,		18,919 21
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,		234,659 62
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, [two wharves, \$8,207.49]; stocks and bonds, [ferry-boat slips, \$14,881.89,]; real estate, [\$2,251,]; fuel, [and supplies,] \$3,351.32,	28,691 70	
55. Income expended in construction and equipment,	-	-
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	15 11-100 miles.	
57. Length of main road in other States, (specifying how much in each,)	-	-
58. Length of single main track,	15 11-100 miles.	
59. Length of double main track,	-	-
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	-	-
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	68-100 miles.	
62. Length of road belonging to other companies, operated by this Company,	-	-
63. Total miles of road operated by this Company,	15 11-100 miles.	
64. Weight of rail, per yard, in main road,	56 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	-	-
66. Maximum grade, with its length, in main road,	24 24-100 ft. for 1 26-100 mls.	
67. Maximum grade, with its length, in branch roads,	-	-
68. Total rise and fall in main road,	52 feet.	
69. Total rise and fall in branch roads,	-	-
70. Shortest radius of curvature, with length of curve, in main road,	1,920 ft. for 1,801 ft.	

71. Shortest radius of curvature, with length of curve in branch roads,	-	-
72. Total degrees of curvature, in main road,	206° 55'	-
73. Total degrees of curvature, in branch roads,	-	-
74. Total length of straight line, in main road,	12 56-100 miles.	-
75. Total length of straight line, in branches,	-	-
76. Aggregate length of wooden truss bridges,	-	-
77. Aggregate length of all other wooden bridges,	110 feet.	-
78. Aggregate length of iron bridges,	-	-
79. Whole length of road unfenced on both sides,	-	-
80. Number of public ways crossed at grade,	22	-
81. Number of railroads crossed at grade,	-	-
82. Remarks,	-	-
83. Way stations for express trains,	-	-
84. Way stations for accommodation trains,	2	-
85. Flag stations,	-	-
86. Whole number of way stations,	2	-
87. Whole number of flag stations,	-	-
DOINGS DURING THE YEAR.*		
88. Miles run by passenger trains,	16,853	-
89. Miles run by freight trains,	9,872	-
90. Miles run by other trains,	-	-
91. Total miles run,	-	26,725
92. Number of passengers carried in the cars,	51,205	-
93. Number of passengers carried one mile,	627,459	-
94. Number of tons of merchandise carried in the cars,	15,151	-
95. Number of tons of merchandise carried one mile,	232,917	-
96. Number of passengers carried one mile, to and from other roads,	436,960	-
97. Number of tons carried one mile, to and from other roads,	185,758	-
98. Rate of speed adopted for express passenger trains, including stops,	-	-
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	-	-
100. Rate of speed adopted for accommodation trains,	26 miles per hour.	-
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	26 miles per hour.	-
102. Average rate of speed actually attained by special trains, including stops and detentions,	-	-
103. Average rate of speed adopted for freight trains, including stops,	15 miles per hour.	-
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile,	313,729	-
105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile,	698,751	-
EXPENDITURES FOR WORKING THE ROAD.*		
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$9,531 73	-
107. For repairs of wooden bridges,	-	-
108. For wages of switchmen, average per month, \$37 00	Total,	800 00
109. For wages of gate-keepers, average per month,		
110. For wages of signal-men, average per month,		
111. For wages of watchmen, average per month, 37 00		

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

112. Number of men employed, exclusive of those engaged in construction,	42		
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	-	-	
114. For repairs of fences, gates, houses for signalmen, gate-keepers, switchmen, tool-houses,	422	14	
115. Total for maintenance of way,			\$10,758 87
MOTIVE POWER AND CARS.			
116. For repairs of locomotives,	\$2,508	04	
117. For new locomotives, to cover depreciation,	-	-	
118. For repairs of passenger cars,	8,115	87	
119. For new passenger cars to cover depreciation,	-	-	
120. For repairs of merchandise cars,	1,907	48	
121. For new merchandise cars to cover depreciation,	-	-	
122. For repairs of gravel and other cars,	-	-	
123. Total for maintenance of motive power and cars,			\$7,530 89
124. Number of engines,	2		
125. Number of passenger cars,	5		
126. Number of baggage cars,	2		
127. Number of merchandise cars,	49		
128. Number of gravel cars,	6		
MISCELLANEOUS.*			
129. For fuel used by engines during the year, viz. :—			
1. Wood, number of cords, 245½. Cost of the same,*	\$1,288	87	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 145. Cost of the same,	1,249	67	
130. For oil used by cars and engines,	223	11	
131. For waste and other material for cleaning,	108	82	
132. For salaries, wages and incidental expenses, chargeable to passenger department,	4,095	38	
133. For salaries, wages and incidental expenses, chargeable to freight department,	3,147	72	
134. For gratuities and damages,	389	61	
135. For taxes and insurance,	456	47	
136. For ferries,	7,156	55	
137. For repairs of station buildings, aqueducts, fixtures, furniture,	637	84	
138. For renewals of iron, including laying down,	362	20	
139. For new iron laid down, deducting the value of old iron taken up,	2,328	62	
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	-	-	
141. For amount paid other companies, as rent for use of their roads, specifying each company,	-	-	
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	770	75	
143. Total miscellaneous,			\$22,215 51
144. Total expenditures for working the road,			40,500 27
145. Total amount of interest paid during the year,			10,320 00
INCOME DURING THE YEAR.*			
146. For <i>Passengers</i> :—			
1. On main road, including branches owned by company,	\$5,982	39	

2. To and from other roads, specifying what, [Cape Cod Railroad,]		\$22,597 31	
147. <i>For Freight</i> :—			
1. On main road and branches owned by Co., .	2,591 88		
2. To and from other connecting roads, . . .	11,588 39		
148. United States mails,	555 36		
149. [Ferry,]	7,508 00		
150. Total income,		\$50,823 33	
151. Net earnings, after deducting expenses, . .	3 06		

WARD M. PARKER,
CHARLES L. WOOD,
TH. S. HATHAWAY,
WM. J. ROTCH,
D. R. GREENE,

Directors of the New Bedford and Taunton Railroad Corporation.

BRISTOL, ss. November 1, 1870. Then personally appeared Ward M. Parker, Charles L. Wood, Thomas S. Hathaway and William J. Rotch, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

ANDREW G. PIERCE, *Justice of the Peace.*

REPORT

OF THE

NEWBURYPORT RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$480,000 00
2. Number of shares of capital stock issued,	2,021	
3. Increase of capital, since last report,	-	-
4. Capital paid in, per last report,	\$220,340 02	
5. Capital paid in, since last report,	-	-
6. Total amount of capital stock paid in,		220,340 02
7. Amount realized in cash value for stock issued,	220,340 02	
8. Funded debt, per last report,	<p>The Newburyport Railroad Co. acknowledges no funded or floating debt or other liability, excepting a funded debt to the Boston and Maine Railroad of \$300,000, without interest, due on the expiration of the lease of its railroad to said Boston and Maine Railroad, viz., Feb. 21, 1860.</p>	
9. Funded debt, paid since last report,		
10. Funded debt, increase of, since last report,		
11. Total present amount of funded debt,		
12. Floating debt, per last report,		
13. Floating debt, paid since last report,		
14. Floating debt, increase of, since last report,		
15. Total present amount of floating debt,		
16. Total present amount of funded and floating debt,		
17. Whole amount in cash value realized from funded and floating debts,		
18. Whole amount in cash value realized from stock and debts,		
19. Average rate of interest per annum paid during the year,		
20. Maximum amount of debts during the year,		
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$197,653 98	
22. For graduation and masonry, paid during the past year,	-	-
23. Total am't expended for graduation and masonry,		\$197,653 98
24. For wooden bridges, per last report,	<p>The bridges are so unimportant that no separate account of their cost has been kept, but is included in above.</p>	
25. For wooden bridges, paid during the past year,		
26. Total amount expended for wooden bridges,		
27. Total amount expended for iron bridges, (if any,)		
28. For superstructure, including iron, per last report,	176,065 02	
29. For superstructure, including iron, paid during the past year,	-	-
30. Total amount expended for superstructure, including iron,		176,065 02
31. For stations, buildings and fixtures, per last report,	81,701 57	
32. For stations, buildings and fixtures, paid during the past year,	-	-

33. Total amount expended for stations, buildings and fixtures,		\$31,701 57
34. For land, land-damages and fences, per last report,	\$86,983 89	
35. For land, land-damages and fences, paid during the past year,	-	-
36. Total amount expended for land, land-damages and fences,		86,983 89
37. For locomotives, per last report,	}	Sold to Boston and Maine Railroad under arrangement of above lease of road.
38. For locomotives paid during the past year,		
39. Total amount expended for locomotives,		
40. For passenger and baggage cars, per last report,		
41. For passenger and baggage cars paid during the past year,		
42. Total amount expended for passenger and baggage cars,		
43. For merchandise cars, per last report,	}	
44. For merchandise cars paid during the past year,		
45. Total amount expended for merchandise cars,		
46. For engineering, per last report,	13,205 32	
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		13,205 32
49. For agencies and other expenses, per last report,	91,776 55	
50. For agencies and other expenses, paid during the past year,	-	-
51. Total amount expended for agencies and other expenses,		91,776 55
52. Amounts of discounts or other sacrifices on stock and bonds issued, [about]	23,400 00	
53. Total cost of road and equipment,		597,886 83
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans,; stocks and bonds, \$13,000; real estate,; fuel,	No assets.	
55. Income expended in construction and equipment,	Nothing.	

CHARACTERISTICS OF ROAD.

56. Length of main road in this State,	26 miles, 5,168 feet.	
57. Length of main road in other States, (specifying how much in each,)	-	-
58. Length of single main track,	26 miles, 5,168 feet.	
59. Length of double main track,	-	-
60. Length of branches owned by the Company, stating whether they have a single or double track, and specifying length in this State, and in each other State,)	-	-
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	2 miles, 2,517 feet.	
62. Length of roads belonging to other companies operated by this Company,	-	-
63. Total miles of road operated by this Company,	-	-
64. Weight of rail, per yard, in main road,	50 and 60 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	None.	
66. Maximum grade, with its length, in main road,	55 feet for 3,000 feet.	
67. Maximum grade, with its length, in branch roads,	-	-
68. Total rise and fall in main road,	430 feet.	
69. Total rise and fall in branch roads,	-	-
70. Shortest radius of curvature, with length of curve, in main road,	} 695 feet curve; length, 1,100 feet.	
71. Shortest radius of curvature, with length of curve, in branch roads,		
72. Total degrees of curvature in main road,	790°	

73. Total degrees of curvature, in branch roads, . . .	-	-
74. Total length of straight line, in main road, . . .	20 miles, 1,172 feet.	
75. Total length of straight line, in branches, . . .	-	-
76. Aggregate length of wooden truss bridges, . . .	-	-
77. Aggregate length of all other wooden bridges, . . .	415 feet.	
78. Aggregate length of iron bridges, . . .	None.	
79. Whole length of road unfenced on both sides, . . .	None.	
80. Number of public ways crossed at grade, . . .	38	
81. Number of railroads crossed at grade, . . .	1	
82. Remarks, . . .	-	-
83. Way stations for express trains, . . .	None.	
84. Way stations for accommodation trains, . . .	8	
85. Flag stations, . . .	3	
86. Whole number of way stations, . . .	8	
87. Whole number of flag stations, . . .	3	
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last Report, . . .	} \$300,000, as by conditions of lease above named.	
160. Mortgage debt paid since last Report, . . .		
161. Increase of mortgage debt since last Report, . . .	None.	
162. Present amount of mortgage debts, . . .	\$300,000 00	
163. Number of mortgages on road and franchise, or any property of the Corporation, . . .	Four.	

NOTE.—This road is leased to Boston and Maine Railroad, and its “DOINGS DURING THE YEAR,” and its “INCOME” and “EXPENDITURES,” are included in the report of that road, its business being so intimately connected that separate accounts have not been kept.

FRANCIS COGSWELL,
PETER T. HOMER,
N. G. WHITE,
GEORGE C. LORD,
JOHN E. BICKFORD,

Directors of the Boston and Maine R. R. for the Newburyport R. R. Corporation.

SUFFOLK, ss., November 1, 1870. Then personally appeared Francis Cogswell, Peter T. Homer, N. G. White, George C. Lord and John E. Bickford, and severally made oath to the truth of the foregoing statement by them subscribed, according to their best knowledge and belief.

Before

C. P. JUDD, *Justice of the Peace.*

REPORT

OF THE

NEW HAVEN AND NORTHAMPTON COMPANY,

FOR THE NINE MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	\$3,000,000 00	
2. Number of shares of capital stock issued, [\$15,000 fuel, \$3,000 scrip,	18,000 00	
3. Increase of capital since last report,	300,000 00	
4. Capital paid in, per last report,	1,500,000 00	
5. Capital paid in since last report,	300,000 00	
6. Total amount of capital stock paid in,		\$1,800,000 00
7. Amount realized in cash value for stock issued,	-	-
8. Funded debt, per last report,	1,000,000 00	
9. Funded debt paid since last report,	-	-
10. Funded debt, increase of, since last report,	400,000 00	
11. Total present amount of funded debt,		1,400,000 00
12. Floating debt, per last report,	259,431 37	
13. Floating debt paid since last report,	73,226 49	
14. Floating debt, increase of, since last report,	-	-
15. Total present amount of floating debt,		186,204 88
16. Total present amount of funded and floating debt,		1,586,204 88
17. Whole amount in cash value realized from funded and floating debts,	-	-
18. Whole amount in cash value realized from stock and debts,	-	-
19. Average rate of interest per annum paid during the year,	} 7 per ct. on \$1,000,000 30 year bonds; 6 per ct. on \$400,000 10 year con- vertible bonds.	
20. Maximum amount of debts during the year,		
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	} See note.*	
22. For graduation and masonry paid during the past year,		

* The details of the "cost of road" cannot be given, as it was built in separate sections, and by different companies, some by contract for completed road at a stated sum and the balance purchased. The cost to January 1, 1870, is as follows:—

New Haven to Granby and Collinsville,	\$1,213,398 67
Granby to State line,	44,620 08
State line to Northampton,	691,081 01
Northampton to Williamsburgh,	878,361 71
Collinsville to New Hartford,	257,857 06
Wharf, 2,350 by 80 feet at New Haven,	108,842 71
Filling basin at New Haven, land purchased, shop buildings, etc.,	202,981 31
Total,	\$2,897,092 54

23. Total am't expended for graduation and masonry,		
24. For wooden bridges, per last report,		
25. For wooden bridges, paid during th past year,		
26. Total amount expended for wooden bridges,		
27. Total amount expended for iron bridges (if any,)		
28. For superstructure, including iron, per last report,		
29. For superstructure, including iron, paid during the past year,		
30. Total amount expended for superstructure, including iron,		
31. For stations, buildings and fixtures, per last report,	} See note on preceding page.	
32. For stations, buildings and fixtures paid during the past year,		
33. Total amount expended for stations, buildings and fixtures,		
34. For land, land-damages and fences, per last report,		
35. For land, land-damages and fences, paid during the past year,		
36. Total amount expended for land, land-damages and fences,		
37. For locomotives, per last report,	\$174,158 87	
38. For locomotives, paid during the past year,	28,410 06	
39. Total amount expended for locomotives,		\$202,568 93
40. For passenger and baggage cars, per last report,	69,382 72	
41. For passenger and baggage cars, paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,		69,382 73
43. For merchandise cars, per last report,	206,645 95	
44. For merchandise cars, paid during the past year,	4,517 48	
45. Total amount expended for merchandise cars,		211,163 43
46. For engineering, per last report,	} See note on preceding page.	
47. For engineering, paid during the past year,		
48. Total amount expended for engineering,		
49. For agencies and other expenses, per last report,		
50. For agencies and other expenses, paid during the past year,		
51. Total amount expended for agencies and other expenses,		
52. Amounts of discounts or other sacrifices on stock and bonds issued,	44,000 00	
53. Total cost of road and equipment,	-	-
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, ; stocks and bonds, ; real estate, ; fuel,	-	-
55. Income expended in construction and equipment,	-	-
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	32 62-100 miles in Mass.	
57. Length of main road in other States, (specifying how much in each,)	51 26-100 miles in Conn.	
58. Length of single main track,	83 88-100 miles.	
59. Length of double main track,	None.	
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	} Farmington to New Hartford, Ct., 14 9-100 single track; Simsbury to Tariffville, Ct., 1 4-100 miles single track.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	-	-

62. Length of roads belonging to other companies operated by this Company, [99 1-100,]	-	-
63. Total miles of road operated by this Company,	99 1-100 miles.	
64. Weight of rail, per yard, in main road,	60 and 56 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	54 and 56 lbs.	
66. Maximum grade, with its length, in main road,	} No figures in the possession of this Company.	
67. Maximum grade, with its length, in branch roads,		
68. Total rise and fall in main road,		
69. Total rise and fall in branch roads,		
70. Shortest radius of curvature, with length of curve, in main road,		
71. Shortest radius of curvature, with length of curve, in branch roads,		
72. Total degrees of curvature in main road,		
73. Total degrees of curvature in branch roads,		
74. Total length of straight line in main road,		
75. Total length of straight line in branches,		
76. Aggregate length of wooden truss bridges,	-	-
77. Aggregate length of all other wooden bridges,	-	-
78. Aggregate length of iron bridges,	-	-
79. Whole length of road unfenced on both sides,	-	-
80. Number of public ways crossed at grade, [82 in Conn. and 48 in Mass.,]	130	
81. Number of railroads crossed at grade, [H. P. & F. at Plainville, Conn., and Boston & Albany at Westfield Mass.,]	2	
82. Remarks,	-	-
83. Way stations for express trains,	18	
84. Way stations for accommodation trains,	24	
85. Flag stations,	6	
86. Whole number of way stations,	24	
87. Whole number of flag stations,	6	
DOINGS DURING THE YEAR.*		
88. Miles run by passenger trains,	142,891 miles.	
89. Miles run by freight trains,	97,644 miles.	
90. Miles run by other trains,	-	-
91. Total miles run,		240,535
92. Number of passengers carried in the cars,	256,394	
93. Number of passengers carried one mile,	3,784,198	
94. Number of tons of merchandise carried in the cars,	131,723 tons,	
95. Number of tons of merchandise carried one mile,	4,792,732	
96. Number of passengers carried one mile, to and from other roads,	1,091,396	
97. Number of tons carried one mile, to and from other roads,	199,959 tons.	
98. Rate of speed adopted for express passenger trains, including stops,	25 miles.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	25 miles.	
100. Rate of speed adopted for accommodation trains,	25 miles.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	-	-
102. Average rate of speed actually attained by special trains, including stops and detentions,	-	-
103. Average rate of speed adopted for freight trains, including stops,	10 miles.	

* All items under the headings marked with an asterisk are required by law for "the total miles of road operated by this company."

104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile, . . . - -
 105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile, . . . - -

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron, [new iron included,] \$80,990 28
 107. For repairs of wooden bridges, 3,342 88
 108. For wages of switchmen, average per month, \$50 00
 109. For wages of gate-keepers, average per month,
 110. For wages of signal-men, average per month,
 111. For wages of watchmen, average per month, 50 00
 112. Number of men employed, exclusive of those engaged in construction, [about,] 400
 113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,) 584 66
 114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses, 4,015 04
 115. Total for maintenance of way, \$88,962 86

MOTIVE POWER AND CARS.

116. For repairs of locomotives, \$8,850 37
 117. For new locomotives, to cover depreciation, } 7,608 42
 118. For repairs of passenger cars,
 119. For new passenger cars, to cover depreciation,
 120. For repairs of merchandise cars, - -
 121. For new merchandise cars, to cover depreciation, - -
 122. For repairs of gravel and other cars, - -
 123. Total for maintenance of motive power and cars, \$16,458 79
 124. Number of engines, 16
 125. Number of passenger cars, 15
 126. Number of baggage cars, 5
 127. Number of merchandise cars, 195
 128. Number of gravel cars, 40

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz.:—
 1. Wood, No. of cords, 1,100. Cost of the same, \$4,952 41
 2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 5,450. Cost of same, 86,371 70
 130. For oil used by cars and engines, 4,263 68
 131. For waste and other material for cleaning, 2,449 82
 132. For salaries, wages and incidental expenses, chargeable to passenger department, } 89,390 30
 133. For salaries, wages and incidental expenses, chargeable to freight department,
 134. For gratuities and damages, 497 50
 135. For taxes and insurance, [included in other accounts,] - -
 136. For ferries, - -
 137. For repairs of station buildings, aqueducts, fixtures, furniture, 1,465 71

* See note on preceding page.

138. For renewals of iron, including laying down, . . .	}	Included in repairs road.	
139. For new iron laid down, deducting the value of old iron taken up, . . .			
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company, . . .			
141. For amount paid other companies, as rent for use of their roads, specifying each company, . . .		-	-
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items, . . .		\$7,768 68	
143. Total miscellaneous, . . .			\$147,159 30
144. Total expenditures for working the road, . . .			252,580 95
145. Total amount of interest paid during the year, . . .			83,033 53
INCOME DURING THE YEAR.*			
146. For Passengers :—			
1. On main road, including branches owned by company, . . .		\$125,055 93	
2. To and from other roads, specifying what, . . .		-	-
147. For Freight :—			
1. On main road and branches owned by Co., . . .		226,519 38	
2. To and from other connecting roads, . . .		-	-
148. U. S. mails, . . .		4,395 86	
149. Rents, [\$2,188.82 ; express, \$8,125.00 ; wharf, etc., \$6,545.76, total,] . . .		16,359 58	
150. Total income, . . .			872,870 75
151. Net earnings, after deducting expenses, . . .			120,289 80
DIVIDENDS.			
152. per cent. Total, . . .	}	Balance of income expended in construction.	
153. Surplus not divided, . . .			
154. Surplus last year, . . .			
155. Total surplus; cash and loans, ; stocks and bonds, ; real estate, ; fuel, . . .		-	-
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—			
156. Of road and bridges, . . .		-	-
157. Buildings, . . .		-	-
158. Engines and cars, . . .		-	-
MORTGAGE DEBTS.			
159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last report, . . .		\$1,000,000 00	
160. Mortgage debt paid since last report, . . .		-	-
161. Increase of mortgage debt since last report, . . .		-	-
162. Present amount of mortgage debts, . . .		1,000,000 00	
163. Number of mortgages on road and franchise, or any property of the Corporation, . . .		1	

ACCIDENTS.

February 8, 1870.—William Bailey, of Agawam, was struck by engine of down freight train at Main Street crossing, Westfield, and injured. Has since recovered.

February 25.—Jas. Pelton, of Springfield, twenty years of age, fell from morning train between Northampton and Florence, while trying to get on the engine, and was killed, living about three hours.

•
May 9.—Amos Coates, of So. Deerfield, helper at freight house, Westfield, climbing on a car of switching train, was knocked off by coming in contact with corner of freight house, and killed.

June 10.—A man by the name of Powers, apparently drunk, was struck by engine of evening train north, near the Catholic church, Northampton, and instantly killed. He was thirty-eight years of age.

JOS. E. SHEFFIELD, *Pres't.*

H. M. WELCH,

WM. W. BOARDMAN,

CHAS. N. YEAMANS, *V. Pres't.*

S. D. PARDEE,

M. G. ELLIOTT,

Directors of the New Haven and Northampton Company.

•
NEW HAVEN, ss. November 2, 1870. Then personally appeared Jos. E. Sheffield, H. M. Welch, Wm. W. Boardman, Chas. N. Yeamans, S. D. Pardee and M. G. Elliott, Directors, and severally made oath to the truth of the foregoing statement by them subscribed.

Before me.

JNO. J. GREENE, *Notary Public.*

REPORT

OF THE

NEW LONDON NORTHERN RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$2,000,000 00
2. Number of shares of capital stock issued,	{ 8,585 1st class. 1,450 2d class.	
3. Increase of capital since last report,	-	-
4. Capital paid in, per last report,	\$1,003,500 00	
5. Capital paid in since last report,	-	-
6. Total amount of capital stock paid in,		1,003,500 00
7. Amount realized in cash value for stock issued,	-	
8. Funded debt, per last report,	651,600 00	
9. Funded debt paid since last report,	-	-
10. Funded debt, increase of, since last report,	-	-
11. Total present amount of funded debt,		651,500 00
12. Floating debt, per last report,	37,500 00	
13. Floating debt paid since last report,	-	-
14. Floating debt, increase of, since last report,	35,000 00	
15. Total present amount of floating debt,		72,500 00
16. Total present amount of funded and floating debt,		724,000 00
17. Whole amount in cash value realized from funded and floating debts,	-	-
18. Whole amount in cash value realized from stock and debts,	-	-
19. Average rate of interest per annum paid during the year,	Seven per cent.	
20. Maximum amount of debts during the year,	724,000 00	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,		
22. For graduation and masonry paid during the past year,		
23. Total am't expended for graduation and masonry,		
24. For wooden bridges, per last report,		
25. For wooden bridges paid during the past year,		
26. Total amount expended for wooden bridges,		
27. Total amount expended for iron bridges, (if any,)		
28. For superstructure, including iron, per last report,		
29. For superstructure, including iron, paid during the past year,		
30. Total amount expended for superstructure, including iron,		
31. For stations, buildings and fixtures, per last report,		
32. For stations, buildings and fixtures paid during the past year,		

33. Total amount expended for stations, buildings and fixtures,	
34. For land, land-damages and fences, per last report,	
35. For land, land-damages and fences paid during the past year,	
36. Total amount expended for land, land-damages, and fences,	
37. For locomotives, per last report,	
38. For locomotives paid during the past year,	
39. Total amount expended for locomotives,	
40. For passenger and baggage cars, per last report,	
41. For passenger and baggage cars paid during the past year,	
42. Total amount expended for passenger and baggage cars,	
43. For merchandise cars, per last report,	
44. For merchandise cars paid during the past year,	
45. Total amount expended for merchandise cars,	
46. For engineering, per last report,	
47. For engineering paid during the past year,	
48. Total amount expended for engineering,	
49. For agencies and other expenses, per last report,	
50. For agencies and other expenses paid during the past year,	
51. Total amount expended for agencies and other expenses,	
52. Amounts of discounts or other sacrifices on stock and bonds issued,	
53. Total cost of road and equipment,	\$1,485,222 78
54. Amount of assets or property held by the corporation in addition to the cost of the road; cash and loans, \$5,500; stocks and bonds,	\$27,616 31
real estate, \$22,116.31; fuel,	22,700 00
55. Income expended in construction and equipment,	
CHARACTERISTICS OF ROAD.	
56. Length of main road in this State,	43½ miles.
57. Length of main road in other States, (specifying how much in each,)	56½ miles, Conn.
58. Length of single main track,	100 miles.
59. Length of double main track,	- -
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	- -
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	About 10 miles.
62. Length of roads belonging to other companies operated by this Company,	- -
63. Total miles of road operated by this Company,	
64. Weight of rail, per yard, in main road,	52 to 57 lbs.
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	- -
66. Maximum grade, with its length, in main road,	66 feet for 2,000 feet.
67. Maximum grade, with its length in branch roads,	- -
68. Total rise and fall in main road,	1,856 feet.
69. Total rise and fall in branch roads,	- -
70. Shortest radius of curvature, with length of curve, in main road,	570 feet for 500 feet.
71. Shortest radius of curvature, with length of curve, in branch roads,	- -
72. Total degrees of curvature in main road,	- -

73. Total degrees of curvature in branch roads, . . .	-	-
74. Total length of straight line in main road, . . .	62 miles.	-
75. Total length of straight line in branches, . . .	-	-
76. Aggregate length of wooden truss bridges, . . .	3,568 feet.	-
77. Aggregate length of all other wooden bridges, . . .	5,850 feet.	-
78. Aggregate length of iron bridges, . . .	-	-
79. Whole length of road unfenced on both sides, . . .	-	-
80. Number of public ways crossed at grade, . . .	82	-
81. Number of railroads crossed at grade, . . .	2	-
82. Remarks, . . .	-	-
83. Way stations for express trains, . . .	-	-
84. Way stations for accommodation trains, . . .	17	-
85. Flag stations, . . .	19	-
86. Whole number of way stations, . . .	-	-
87. Whole number of flag stations, . . .	-	-

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains, [N. & W., 6,760,]	180,649	
89. Miles run by freight trains, [N. & W., 14,040,]	92,055	
90. Miles run by other trains, . . .	4,320	
91. Total miles run, . . .		287,024
92. Number of passengers carried in the cars, [N. & W., 41,842,]	333,563	
93. Number of passengers carried one mile, [N. & W., 543,946,]	5,207,667	
94. Number of tons of merchandise carried in the cars, [N. & W., 56,001,]	165,716	
95. Number of tons of merchandise carried one mile, [N. & W., 728,013,]	5,642,919	
96. Number of passengers carried one mile, to and from other roads, . . .	-	-
97. Number of tons carried one mile, to and from other roads, . . .	-	-
98. Rate of speed adopted for express passenger trains, including stops, . . .	-	-
99. Average rate of speed actually attained by express passenger trains, including stops and detentions, . . .	-	-
100. Rate of speed adopted for accommodation trains, . . .	23 miles.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions, . . .	-	-
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	-	-
103. Average rate of speed adopted for freight trains, including stops, . . .	6½ miles.	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile, . . .	-	-
105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile, . . .	-	-

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron, . . .	\$86,839 83
107. For repairs of wooden bridges, . . .	13,034 03

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

108. For wages of switchmen, average per month,	\$40 00	} Total,	\$6,466 09
109. For wages of gate-keepers, average per month,	None.		
110. For wages of signal-men, average per month,	40 00		
111. For wages of watchmen, average per month,	40 00		
112. Number of men employed, exclusive of those engaged in construction,	300		
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used.)	571 17		
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,	4,157 66		
115. Total for maintenance of way,			\$111,068 78
MOTIVE POWER AND CARS.			
116. For repairs of locomotives,	\$18,111 68		
117. For new locomotives, to cover depreciation,	-		-
118. For repairs of passenger cars,	15,947 85		
119. For new passenger cars, to cover depreciation,	-		-
120. For repairs of merchandise cars,	15,184 87		
121. For new merchandise cars, to cover depreciation,	-		-
122. For repairs of gravel and other cars,	59 12		
123. Total for maintenance of motive power and cars,			\$49,303 52
124. Number of engines,	15		
125. Number of passenger cars,	15		
126. Number of baggage cars,	8		
127. Number of merchandise cars,	219		
128. Number of gravel cars,	-		-
[Number of coal cars,]	90		
MISCELLANEOUS.*			
129. For fuel used by engines during the year, viz.:—		} Total,	\$42,399 86
1. Wood, number of cords, Cost of the same,			
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) Cost of same,			
130. For oil used by cars and engines,	5,012 81		
131. For waste and other material for cleaning,	1,699 99		
132. For salaries, wages, and incidental expenses, chargeable to passenger department,	24,299 17		
133. For salaries, wages, and incidental expenses, chargeable to freight department,	34,158 75		
134. For gratuities and damages,	3,520 22		
135. For taxes and insurance,	13,407 47		
[Machine shop and tools,]	3,767 09		
136. For ferries,	-		-
137. For repairs of station buildings, aqueducts, fixtures, furniture,	8,955 92		
138. For renewals of iron, including laying down,	-		-
139. For new iron laid down, deducting the value of old iron taken up,	-		-
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	-		-
141. For amount paid other companies, as rent for use of their roads, specifying each company,	-		-

* See note on preceding page.

142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	\$12,679 61	
143. Total miscellaneous,		\$149,900 89
144. Total expenditures for working the road,		310,273 19
145. Total amount of interest paid during the year,		38,008 25
INCOME DURING THE YEAR.*		
146. <i>For Passengers</i> :—		
1. On main road including branches owned by company,	\$165,602 24	
2. To and from other roads, specifying what,	—	—
147. <i>For Freight</i> :		
1. On main road and branches owned by company,	190,961 01	
2. To and from other connecting roads,	—	—
148. U. S. mails, [and express,]	12,713 78	
149. Rents,	6,489 38	
150. Total income,		\$375,766 41
151. Net earnings, after deducting expenses,	27,484 97	
DIVIDENDS.		
152. 4 per cent. Total,		\$34,300 00
153. Surplus not divided,	—	—
154. Surplus last year,	—	—
155. Total surplus; cash and loans, ;		
stocks and bonds, ;		
fuel,	—	—
ESTIMATED DEPRECIATION BEYOND THE RENEWALS,		
VIZ. :—		
156. Of road and bridges,	—	—
157. Buildings,	—	—
158. Engines and cars,	—	—
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last Report,	\$360,000 00	
160. Mortgage debt paid since last report,	—	—
161. Increase of mortgage debt since last report,	—	—
162. Present amount of mortgage debts,	360,000 00	
163. Number of mortgages, on road and franchise or any property of the Corporation,	2	

A. N. RAMSDELL,
HENRY P. HAVEN,
W. W. BILLINGS,
BENJ. STARK,

Directors of the New London Northern Railroad Company.

STATE OF CONNECTICUT.

NEW LONDON, ss. November 1, 1870. Then personally appeared A. N. Ramsdell, Henry P. Haven, W. W. Billings and Benj. Stark, and severally made oath to the truth of the foregoing statement by them subscribed.

Before me,

ROB. COIT, Jr., *Justice of the Peace.*

NORWICH AND WORCESTER RAILROAD CORPORATION.

[The Report of this Railroad, (not received at date of printing), will be found on a subsequent page. See Index.]

REPORT

OF THE

OLD COLONY AND NEWPORT RAILWAY COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	\$5,000,000 00
2. Number of shares of capital stock issued,	49,590
8. Increase of capital since last report,	156 shares.
4. Capital paid in, per last report,	\$4,943,420 00
5. Capital paid in since last report,	15,600 00
6. Total amount of capital stock paid in,	4,959,020 00
7. Amount realized in cash value for stock issued,	4,770,190 00
8. Funded debt, per last report,	2,971,000 00
9. Funded debt paid since last report,	92,000 00
10. Funded debt, increase of, since last report,	-
11. Total present amount of funded debt,	2,879,000 00
12. Floating debt, per last report,	61,000 00
13. Floating debt paid since last report,	-
14. Floating debt, increase of, since last report,	46,600 00
15. Total present amount of floating debt,	107,600 00
16. Total present amount of funded and floating debt,	2,986,600 00
17. Whole amount in cash value realized from funded and floating debts,	2,964,593 75
18. Whole amount in cash value realized from stock and debts,	7,734,783 75
19. Average rate of interest per annum paid during the year,	-
20. Maximum amount of debts during the year,	2,986,600 00
COST OF ROAD AND EQUIPMENT.	
[For cost of Abington Branch, per last report,]	\$129,098 87
21. For graduation and masonry, per last report,	\$1,577,972 03
22. For graduation and masonry paid during the past year,	-
23. Total amount expended for graduation and masonry,	\$1,577,972 03
24. For wooden bridges, per last report,	322,477 99
25. For wooden bridges paid during the past year,	-
26. Total amount expended for wooden bridges,	322,477 99
27. Total amount expended for iron bridges, (if any,)	-
28. For superstructure, including iron, per last report,	1,457,715 08
29. For superstructure, including iron, paid during the past year,	-
30. Total amount expended for superstructure, including iron,	1,457,715 03
31. For stations, buildings and fixtures, per last report,	1,226,981 40
32. For stations, buildings and fixtures paid during the past year,	7,675 00

33. Total amount expended for stations, buildings and fixtures,	\$1,234,656 40
34. For land, land-damages and fences, per last report, [\$1,863,888 51,]	
[Less for land sold, 25,885 85,]	\$1,838,502 66
35. For land, land-damages and fences paid during the past year,	10,575 60
36. Total amount expended for land, land-damages, and fences,	1,849,078 26
37. For locomotives, per last report,	278,009 80
38. For locomotives paid during the past year,	-
39. Total amount expended for locomotives,	278,009 80
40. For passenger and baggage cars, per last report,	156,142 04
41. For passenger and baggage cars paid during the past year,	-
42. Total amount expended for passenger and baggage cars,	156,142 04
43. For merchandise cars, per last report,	222,664 64
44. For merchandise cars paid during the past year,	-
45. Total amount expended for merchandise cars,	222,664 64
46. For engineering, per last report,	442,129 08
47. For engineering paid during the past year,	158 42
48. Total amount expended for engineering,	442,287 50
49. For agencies and other expenses, per last report,	116,579 31
50. For agencies and other expenses, paid during the past year,	-
51. Total amount expended for agencies and other expenses,	116,579 31
52. Amounts of discounts or other sacrifices on stock and bonds issued, [construction account to be charged with,]	92,297 88
53. Total cost of road and equipment,	7,878,979 80
54. Amount of assets or property held by the corporation in addition to the cost of the road; cash and loans, \$93,696.89; stocks and bonds, \$231,249; real estate,; fuel, \$61,907.75,	-
55. Income expended in construction and equipment,	160,515 54

CHARACTERISTICS OF ROAD.

56. Length of main road in this State,	114½ miles.
57. Length of main road in other States, (specifying how much in each,)	16½ miles in R. I.
58. Length of single main track,	117¾ miles.
59. Length of double main track,	12¾ miles.
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	12 1-6 miles single track this State.
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	32 miles, 275½ rods.
62. Length of roads belonging to other companies operated by this Company,	None.
63. Total miles of road operated by this Company,	142¾ miles.
64. Weight of rail, per yard, in main road,	54 to 60 lbs.
65. Weight of rail, per yard, in branch roads (specify the different weights per yard,)	50 to 56 lbs.
66. Maximum grade, with its length, in main road,	44 85-100 for 400 feet.
67. Maximum grade, with its length, in branch roads,	30 6-10 for 875 feet.
68. Total rise and fall in main road,	2,392 feet.
69. Total rise and fall in branch roads,	198 feet.
70. Shortest radius of curvature, with length of curve, in main road,	520 for 420 feet.

71. Shortest radius of curvature, with length of curve, in branch roads,	301 for 140 feet.
72. Total degrees of curvature in main road,	2,642°
73. Total degrees of curvature in branch roads,	242°
74. Total length of straight line in main road,	98 miles, 1,992 feet.
75. Total length of straight line in branches,	7 miles, 909 feet.
76. Aggregate length of wooden truss bridges,	464 feet.
77. Aggregate length of all other wooden bridges,	4,632 feet.
78. Aggregate length of iron bridges,	None.
79. Whole length of road unfenced on both sides,	About 8 miles.
80. Number of public ways crossed at grade,	120
81. Number of railroads crossed at grade,	One crossed twice.
82. Remarks,	-
83. Way stations for express trains,	5
84. Way stations for accommodation trains,	50
85. Flag stations,	12
86. Whole number of way stations,	50
87. Whole number of flag stations,	12

DOINGS DURING THE YEAR.* [10 Mos.]

88. Miles run by passenger trains,	525,379	
89. Miles run by freight trains,	223,792	
90. Miles run by other trains,	21,598	
91. Total miles run,		770,769
92. Number of passengers carried in the cars,	2,265,898	
93. Number of passengers carried one mile,	35,486,808	
94. Number of tons of merchandise carried in the cars,	274,200	
95. Number of tons of merchandise carried one mile,	7,461,066	
96. Number of passengers carried one mile, to and from other roads,	12,099,507	
97. Number of tons carried one mile, to and from other roads,	3,177,823	
98. Rate of speed adopted for express passenger trains, including stops,	33 miles per hour.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	33 miles per hour.	
100. Rate of speed adopted for accommodation trains,	23 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	23 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	20 miles per hour.	
103. Average rate of speed adopted for freight trains, including stops,	12 miles per hour.	
104. Estimated weight, in tons, of passenger cars, (not including passengers,) hauled one mile,	13,074,194	
105. Estimated weight, in tons, of merchandise cars, (not including freight,) hauled one mile,	15,774,941	

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road; maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$125,726 54
107. For repairs of wooden bridges,	6,891 00

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

108. For wages of switchmen, average per month,	\$41 53	Total,	\$10,465 26	
109. For wages of gate-keepers, average per month,	41 06		4,921 73	
110. For wages of signal-men, average per month,	31 43		3,772 15	
111. For wages of watchmen, average per month,	47 93		6,901 62	
112. Number of men employed, exclusive of those engaged in construction,		626		
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)			1,101 75	
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,			2,290 26	
115. Total for maintenance of way,				\$162,070 31
MOTIVE POWER AND CARS.				
116. For repairs of locomotives,			\$40,596 94	
117. For new locomotives, to cover depreciation,			-	-
118. For repairs of passenger cars,			30,887 09	
119. For new passenger cars, to cover depreciation,			18,274 44	
120. For repairs of merchandise cars,			16,675 94	
121. For new merchandise cars, to cover depreciation,			2,204 05	
122. For repairs of gravel and other cars,			6,200 31	
123. Total for maintenance of motive power and cars,				\$114,838 77
124. Number of engines,		38		
125. Number of passenger cars,		73		
126. Number of baggage cars,		18		
127. Number of merchandise cars,		{ 380 8-wheel ; 37 4-wheel= 797		
128. Number of gravel [and coal] cars,			92	
MISCELLANEOUS.*				
129. For fuel used by engines during the year, [10 mos.,] viz. :—				
1. Wood, number of cords, 1,158. Cost of the same,			\$5,760 55	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 11,430. Cost of same,			94,963 60	
130. For oil used by cars and engines,			10,955 30	
131. For waste and other material for cleaning,			3,472 62	
132. For salaries, wages and incidental expenses, chargeable to passenger department,			108,038 03	
133. For salaries, wages and incidental expenses, chargeable to freight department,			95,423 06	
134. For gratuities and damages,			3,366 73	
135. For taxes and insurance,			98,767 55	
136. For ferries,			-	-
137. For repairs of station buildings, aqueducts, fixtures, furniture,			29,773 49	
138. For renewals of iron, including laying down,			-	-
139. For new iron laid down, deducting the value of old iron taken up,			28,911 10	
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,			-	-
141. For amount paid other companies, as rent for use of their roads, specifying each company,			-	-

* See note on preceding page.

142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	\$45,884 47	
143. Total miscellaneous,		\$525,226 50
144. Total expenditures for working the road,		802,185 58
145. Total amount of interest paid during the year, [10 mos.,]		777,357 54
INCOME DURING THE YEAR.* [10 Mos.]		
146. <i>For Passengers</i> :—		
1. On main road, including branches owned by Company,	\$805,723 77	
2. To and from other roads, specifying what,	-	-
147. <i>For Freight</i> :—		
1. On main road and branches owned by Company,	384,620 40	
2. To and from other connecting roads, [expresses,]	53,540 42	
148. U. S. mails,	6,642 35	
149. Rents,	20,888 85	
[Miscellaneous sources, extra baggage, &c.,]	5,932 32	
150. Total income,		\$1,276,848 11
151. Net earnings, after deducting expenses,	297,354 99	
DIVIDENDS.		
152. 3 per cent. Total,		\$156,600 00
153. Surplus not divided,	-	-
154. Surplus last year, [\$294,109.28; less \$16,594.85 U. S. tax on surplus and debts charged off,]	\$277,514 42	
155. Total surplus; cash and loans, ; stocks and bonds, ; real estate, ; fuel, [See No. 54.]		418,269 42
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ.:—		
156. Of road and bridges,	-	-
157. Buildings,	-	-
158. Engines and cars,	-	-
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage, of road and franchise or any property of the Corporation, per last report,	-	-
160. Mortgage debt paid since last report,	-	-
161. Increase of mortgage debt since last report,	-	-
162. Present amount of mortgage debts,	-	-
163. Number of mortgages, on road and franchise or any property of the Corporation,	-	-

ACCIDENTS.

January 27, 1870.—Margaret Carey, about twelve years of age, was struck by an inward train at the Federal Street crossing, injuring her quite severely.

January 29.—Herman Dorr fell from a train while it was in motion near the draw-bridge in Boston, and was killed.

February 15.—A United States sailor, while "en route" for New York, leaped from the steamboat train in Easton, and was fatally injured.

April 29.—John Gallagher, while standing upon the track near No. Abington station, was struck by a train and fatally injured.

June 22.—John Sweeney threw himself in front of a train near Steep Brook station, and was instantly killed.

June 29.—Michael O'Riley, fatally injured in attempting to pass through the Boston yard.

August 23.—John J. Marks, a brakeman, fatally injured by an accident at South Braintree.

September 22.—An unknown man found dead by the track between Bridgewater and Titicut. Supposed to have been struck by the evening train of the previous day.

September 27.—James Leary, in attempting to cross the track in Fall River, had his wagon struck by an engine, throwing him out and crushing his leg and foot.

ONSLOW STEARNS,
URIEL CROCKER,
SAM'L L. CROCKER,
JOHN S. BRAYTON,
ROYAL W. TURNER,
JACOB H. LOUD,

Directors of the Old Colony and Newport Railway Corporation.

SUFFOLK, ss. November 2, 1870. Then personally appeared Onslow Stearns, Uriel Crocker, Sam'l L. Crocker, John S. Brayton, Royal W. Turner, Jacob H. Loud, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

JOHN M. WASHBURN, *Justice of the Peace.*

R E P O R T

OF THE

PITTSFIELD AND NORTH ADAMS R. R. CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$500,000 00
2. Number of shares of capital stock issued,	None.	
3. Increase of capital since last report,	None.	
4. Capital paid in, per last report,	None.	
5. Capital paid in since last report,	None.	
6. Total amount of capital stock paid in,		450,000 00
7. Amount realized in cash value for stock issued,	None.	
8. Funded debt, per last report,	None.	
9. Funded debt paid since last report,	None.	
10. Funded debt, increase of, since last report,	None.	
11. Total present amount of funded debt,	None.	
12. Floating debt, per last report,	None.	
13. Floating debt paid since last report,	None.	
14. Floating debt, increase of, since last report,	None.	
15. Total present amount of floating debt,	None.	
16. Total present amount of funded and floating debt,	None.	
17. Whole amount in cash value realized from funded and floating debts,	None.	
18. Whole amount in cash value realized from stock and debts,	None.	
19. Average rate of interest per annum, paid during the year,	None.	
20. Maximum amount of debts during the year,	None.	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$108,827 47	
22. For graduation and masonry paid during the past year,	-	-
23. Total am't expended for graduation and masonry,		\$108,827 47
24. For wooden bridges, per last report,	7,244 00	
25. For wooden bridges paid during the past year,	-	-
26. Total amount expended for wooden bridges,		7,244 00
27. Total amount expended for iron bridges (if any,)		1,303 62
28. For superstructure, including iron, per last report,	201,395 31	
29. For superstructure, including iron, paid during the past year,	-	-
30. Total amount expended for superstructure, including iron,		201,395 31
31. For stations, buildings and fixtures, per last report,	29,311 33	
32. For stations, buildings and fixtures paid during the past year,	-	-

33. Total amount expended for stations, buildings and fixtures,		\$29,311 38
34. For land, land-damages and fences, per last report,	\$63,742 95	
35. For land, land-damages and fences paid during the past year,	-	-
36. Total amount expended for land, land-damages and fences,		63,742 95
37. For locomotives, per last report,	7,000 00	
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,		7,000 00
40. For passenger and baggage cars, per last report,	4,247 43	
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,		4,247 43
43. For merchandise cars, per last report,	None.	
44. For merchandise cars paid during the past year,	None.	
45. Total amount expended for merchandise cars,	None.	
46. For engineering, per last report,	20,605 56	
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		20,605 56
49. For agencies and other expenses, per last report,	None.	
50. For agencies and other expenses paid during the past year,	None.	
51. Total amount expended for agencies and other expenses,	None.	
52. Amounts of discounts or other sacrifices on stock and bonds issued,	None.	
53. Total cost of road and equipment,		443,677 67
54. Amount of assets or property held by the corporation, in addition to the cost of the road, cash and loans, ; stocks and bonds, ; real estate, ; fuel,	None.	
55. Income expended in construction and equipment,	None.	

CHARACTERISTICS OF ROAD.

56. Length of main road in this State,	18 65-100 miles.
57. Length of main road in other States, (specifying how much in each,)	None.
58. Length of single main track,	18 65-100 miles.
59. Length of double main track,	None.
60. Length of branches owned by the company, stating whether they have a single or double track, and specifying length in this State, and in each other State,)	None.
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	1 42-100 miles.
62. Length of roads belonging to other companies operated by this Company,	None.
63. Total miles of road operated by this Company,	18 65-100 miles.
64. Weight of rail, per yard, in main road,	61 lbs.
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	None.
66. Maximum grade, with its length, in main road,	66 feet; 222 long.
67. Maximum grade, with its length, in branch roads,	None.
68. Total rise and fall in main road,	365 feet.
69. Total rise and fall in branch roads,	None.
70. Shortest radius of curvature, with length of curve, in main road,	477½ feet; 722 feet long.
71. Shortest radius of curvature, with length of curve, in branch roads,	None.
72. Total degrees of curvature, in main road,	710°

73. Total degrees of curvature in branch roads, . . .	None.
74. Total length of straight line in main road, . . .	13 89-100.
75. Total length of straight line in branches, . . .	None.
76. Aggregate length of wooden truss bridges, . . .	364 feet.
77. Aggregate length of all other wooden bridges, . . .	None.
78. Aggregate length of iron bridges, . . .	30 feet.
79. Whole length of road unfenced on both sides, . . .	None.
80. Number of public ways crossed at grade, . . .	17
81. Number of railroads crossed at grade, . . .	None.
82. Remarks,	None.
83. Way stations for express trains,	None.
84. Way stations for accommodation trains,	4
85. Flag stations,	2
86. Whole number of way stations,	6
87. Whole number of flag stations,	2

NOTE.—The Doings, Expenditures and Receipts are included in and made part of the Boston and Albany Railroad report.

C. W. CHAPIN,
JOSIAH STICKNEY,
J. A. RUMRILL,
IGNATIUS SARGENT,

Directors of the Pittsfield and North Adams Railroad Corporation.

SUFFOLK, ss. November 2, 1870. Then personally appeared C. W. Chapin, Josiah Stickney, J. A. Rumrill and Ignatius Sargent, and severally made oath to the truth of the foregoing statement by them subscribed.

Before me,

CHAS. E. STEVENS, *Justice of the Peace.*

REPORT
OF THE
PROVIDENCE AND WORCESTER R. R. CORPORATION,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	\$2,000,000 00	
2. Number of shares of capital stock issued,	20,000	
3. Increase of capital since last report,	No increase.	
4. Capital paid in, per last report,	2,000,000 00	
5. Capital paid in since last report,	None.	
6. Total amount of capital stock paid in,	\$2,000,000 00	
7. Amount realized in cash value for stock issued,	None issued.	
8. Funded debt, per last report,	None.	
9. Funded debt paid since last report,	None.	
10. Funded debt, increase of, since last report,	46,000 00	
11. Total present amount of funded debt,		46,000 00
12. Floating debt, per last report,	55,000 00	
13. Floating debt paid since last report,	None.	
14. Floating debt, increase of, since last report,	80,000 00	
15. Total present amount of floating debt,		135,000 00
16. Total present amount of funded and floating debt,		181,000 00
17. Whole amount in cash value realized from funded and floating debts,	181,000 00	
18. Whole amount in cash value realized from stock and debts,	2,181,000 00	
19. Average rate of interest per annum, paid during the year,	7 per cent.	
20. Maximum amount of debts during the year,	181,000 00	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry per last report,	These items embraced in "construction" accounts; no separate accounts kept.	
22. For graduation and masonry paid during the past year,		
23. Total amount expended for graduation and masonry,		
24. For wooden bridges, per last report,		
25. For wooden bridges paid during the past year,		
26. Total amount expended for wooden bridges,		
27. Total amount expended for iron bridges, (if any,)		
28. For superstructure, including iron, per last report,		
29. For superstructure, including iron, paid during the past year,		
30. Total amount expended for superstructure, including iron,		
31. For stations, buildings and fixtures, per last report,		
32. For stations, buildings and fixtures, paid during the past year,		
33. Total amount expended for stations, buildings and fixtures,		

152 PROVIDENCE AND WORCESTER RAILROAD. [Jan.

34. For land, land-damages and fences, per last report,	} These items embraced in "construction" account; no separate accounts kept.	
35. For land, land-damages and fences, paid during the past year,		
36. Total amount expended for land, land-damages, and fences,		
[Construction per last report,]		\$1,558,297 20
[Increased during the past ten months,]		60,276 79
[Total present amount of construction.]		\$1,618,573 99
37. For locomotives, per last report,		166,609 35
38. For locomotives paid during the past year,		None.
39. Total amount expended for locomotives,		166,609 35
40. For passenger and baggage cars, per last report,		74,320 00
41. For passenger and baggage cars paid during the past year,		3,800 00
42. Total amount expended for passenger and baggage cars,		78,120 00
43. For merchandise cars, per last report,		234,545 63
44. For merchandise cars paid during the past year,		30,436 57
45. Total amount expended for merchandise cars,		264,982 20
46. For engineering, per last report,	} Embraced in "construc- tion" account.	
47. For engineering paid during the past year,		
48. Total amount expended for engineering,		
49. For agencies and other expenses, per last report,		None.
50. For agencies and other expenses, paid during the past year,		None.
51. Total amount expended for agencies and other expenses,		None.
52. Amounts of discounts or other sacrifices on stock and bonds issued,		None.
53. Total cost of road and equipment,		2,128,285 54
54. Amount of assets or property held by the corpora- tion in addition to the cost of the road; cash and loans, \$56,137.70; stocks and bonds, ; real estate,; fuel, [iron rails, lumber, etc.,] \$114,275.14,		170,412 84
55. Income expended in construction and equipment,		None.
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,		25.51 miles.
57. Length of main road in other States, (specifying how much in each,) [Rhode Island,]		17.90 miles.
58. Length of single main track,		26 miles.
59. Length of double main track,		17.41 miles.
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)		1 mile, single track; Mass.
61. Aggregate length of sidings, and other tracks, ex- cepting main track and branches,		14½ miles.
62. Length of roads belonging to other companies operated by this Company,		3.877 miles.
63. Total miles of road operated by this Company,		47.287 miles.
64. Weight of rail, per yard, in main road,		56 to 63 lbs.
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)		60 lbs.
66. Maximum grade, with its length, in main road,		27 ft. per mile for 4,300 ft.
67. Maximum grade, with its length, in branch roads,		Not known,
68. Total rise and fall in main road,		Rise, 526 feet; fall 56 feet.
69. Total rise and fall in branch roads,		Not known.
70. Shortest radius of curvature, with length of curve, in main road,		716 feet for 875 feet.

71. Shortest radius of curvature, with length of curve, in branch roads,	No curve.
72. Total degrees of curvature in main road,	2,546° 30'
73. Total degrees of curvature in branch roads,	No curve.
74. Total length of straight line in main road,	31 miles.
75. Total length of straight line in branches,	1 mile.
76. Aggregate length of wooden truss bridges,	3,855 feet.
77. Aggregate length of all other wooden bridges,	1,300 feet.
78. Aggregate length of iron bridges,	None.
79. Whole length of road unfenced on both sides,	None.
80. Number of public ways crossed at grade,	43
81. Number of railroads crossed at grade,	1
82. Remarks,	-
83. Way stations for express trains,	2
84. Way stations for accommodation trains,	18
85. Flag stations,	2
86. Whole number of way stations,	18
87. Whole number of flag stations,	2

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains,	156,385
89. Miles run by freight trains,	170,510
90. Miles run by other trains,	22,570
91. Total miles run,	349,465
92. Number of passengers carried in the cars,	1,155,145
93. Number of passengers carried one mile,	10,416,520
94. Number of tons of merchandise carried in the cars,	329,550
95. Number of tons of merchandise carried one mile,	10,383,430
96. Number of passengers carried one mile to and from other roads,	956,982
97. Number of tons carried one mile to and from other roads,	5,126,830
98. Rate of speed adopted for express passenger trains, including stops,	30 miles per hour.
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	30 miles per hour.
100. Rate of speed adopted for accommodation trains,	20 miles per hour.
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	20 miles per hour.
102. Average rate of speed actually attained by special trains, including stops and detentions,	25 miles per hour.
103. Average rate of speed adopted for freight trains, including stops,	12 miles per hour.
104. Estimated weight, in tons, of passenger cars (not including passengers) hauled one mile,	4,399,180
105. Estimated weight, in tons, of merchandise cars, (not including freight) hauled one mile,	14,113,410

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges and renewals of iron,	\$80,387 06
107. For repairs of wooden bridges,	1,858 65

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

154 PROVIDENCE AND WORCESTER RAILROAD. [Jan.

108. For wages of switchmen, average per month, \$		
109. For wages of gate-keepers, average per month,		
110. For wages of signal-men, average per month,		
111. For wages of watchmen, average per month,		
112. Number of men employed, exclusive of those engaged in construction,	418	
113. For removing ice and snow (this item to include all labor, tools, repairs, and extra steam-power used,)		\$471 88
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,		1,662 85
115. Total for maintenance of way,		\$84,380 44
MOTIVE POWER AND CARS.		
116. For repairs of locomotives,		\$29,740 00
117. For new locomotives, to cover depreciation,		11,000 00
118. For repairs of passenger cars,		11,700 00
119. For new passenger cars, to cover depreciation,		12,800 00
120. For repairs of merchandise cars,		17,800 00
121. For new merchandise cars, to cover depreciation,		9,000 00
122. For repairs of gravel and other cars,	{	Included in merchandise cars.
123. Total for maintenance of motive power and cars,		\$92,040 00
124. Number of engines,	21	
125. Number of passenger cars,	24	
126. Number of baggage cars,	6	
127. Number of merchandise cars,	392	
128. Number of [coal] cars,	460	
MISCELLANEOUS.*		
129. For fuel used by engines during the year, viz. :—		
1. Wood, No. of cords, 581. Cost of the same, \$3,981.47,	{	\$55,153 83
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) \$6,984. Cost of same, \$51,172.36,		
130. For oil used by cars and engines,		5,525 65
131. For waste and other material for cleaning,		2,509 98
132. For salaries, wages and incidental expenses, chargeable to passenger department,		43,624 26
133. For salaries, wages and incidental expenses, chargeable to freight department,		89,970 16
134. For gratuities and damages,		787 42
135. For taxes and insurance,		18,530 60
136. For ferries,		None.
137. For repairs of station buildings, aqueducts, fixtures, furniture,		10,663 28
138. For renewals of iron, including laying down,		Included in road repairs.
139. For new iron laid down, deducting the value of old iron taken up,		28,983 94
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,		None.
141. For amount paid other companies as rent for use of their roads, specifying each company, [Milford and Woonsocket R. R. for 6 months,]		2,500 00

* See note on preceding page.

142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	\$83,236 26	
143. Total miscellaneous,		\$291,485 33
144. Total expenditures for working the road, [\$467,905.77,]	}	472,562 31
145. Total amount of interest paid during the year, [\$4,656.54,]		
INCOME DURING THE YEAR.*		
146. For Passengers :—		
1. On main road, including branches owned by company,	}	\$280,174 41
2. To and from other roads, specifying what,		
147. For Freight :—		
1. On main road and branches owned by Co.,	}	365,290 83
2. To and from other connecting roads,		
148. U. S. mails, [\$4,140.74; express, \$9,418.68,]		13,559 42
149. Rents,		2,692 01
150. Total income,		\$661,716 67
151. Net earnings, after deducting expenses,		189,154 36
DIVIDENDS.		
152. 5 per cent [for 6 months]. Total,		\$100,000 00
153. Surplus not divided,		89,154 36
154. Surplus last year,		28,544 02
155. Total surplus; cash and loans, \$3,423.24; stocks and bonds,; real estate,; fuel, [iron rails, lumber, etc., \$114,275.14,]		\$117,698 38
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIA :—		
156. Of road and bridges,		None.
157. Buildings,		None.
158. Engines and cars,		None.
MORTGAGE DEBTS.		
159. Amount of debts, secured by mortgage of road and franchise or any property of the corporation, per last report,		None.
160. Mortgage debt, paid since last report,		None.
161. Increase of mortgage debt, since last report,		\$46,000 00
162. Present amount of mortgage debts,		46,000 00
163. Number of mortgages, on road and franchise or any property of the corporation,		One.

ACCIDENTS.

December 18, 1869.—I. McWilliams, freight brakeman, while switching at Woonsocket, fell from and under a freight car, receiving fatal injuries.

January 27, 1870.—Henry E. Welden, in attempting to get upon a moving passenger train, fell between the cars and platform at Ashton, receiving severe flesh injuries.

March 11, 1870.—William Mellor, while walking upon the track near Quinsigamond was struck by the locomotive of a freight train and slightly injured.

April 1, 1870.—Samuel H. Gaskill, with his wife, in attempting to drive over the track at Buffum's Crossing, (Woonsocket,) before an advancing train, his horse

156 PROVIDENCE AND WORCESTER RAILROAD. [Jan.

balked, causing the train to come in collision with the carriage, from which both were thrown out. Mr. Gaskell received very slight injuries and his wife was killed.

May 26, 1870.—Thomas Carpenter, in attempting to pass between the cars of a freight train at Valley Falls, was run over and instantly killed.

May 27, 1870.—Patrick Leahy while attempting to get upon a moving freight engine near Quinsigamond fell, the engine passing over and crushing one leg.

July 8, 1870.—A. C. Thomas, an employé, in attempting to pass from car to car on a freight train, fell under the train and was fatally injured.

July 11, 1870.—Jesse Annis, freight brakeman, was killed by a freight car being thrown from the track near Albion.

July 16, 1870.—Charles McKanna jumped from the passenger train while in motion at Valley Falls, fell, one car passing over and crushing his right arm.

August 15, 1870.—John Reagan, an employé in freight yard at Providence, fell from and in front of the switching engine and was killed.

August 16, 1870.—Mary McAndrews, an aged lady, was killed while walking upon the track in the evening near Air Line Junction, Woonsocket.

August 27, 1870.—William Feely, in attempting to get upon a moving passenger train at Whitin's Crossing, fell under the train and had one arm cut off.

EARL P. MASON,
PAUL WHITIN,
HARVEY CHACE,
JAMES Y. SMITH,
LYMAN A. COOK,
G. L. SPENCER,
WILLIAM S. SLATER,
ISAAC H. SOUTHWICK,

Directors of the Providence and Worcester Railroad Corporation.

THE STATE OF RHODE ISLAND.

COUNTY OF PROVIDENCE, ss. In Providence the 12th day of October, A. D. 1870, before me personally appeared Earl P. Mason, Paul Whitin, James Y. Smith, Lyman A. Cook, Gidéon L. Spencer, William S. Slater, and Isaac H. Southwick, and severally made oath, and Harvey Chace who affirmed to the truth of the foregoing statement by them subscribed.

EDWIN METCALF, *Justice of the Peace.*

PROVIDENCE, October 14, 1870. The undersigned, Commissioners of the Providence and Worcester Railroad Company, have examined this Report, and believe it to be correct, and hereby approve the same.

HARTLEY WILLIAMS,
Commissioner for Massachusetts.
JOHN R. BARTLETT,
Commissioner for Rhode Island.

Report of the Commissioners of the Providence and Worcester Railroad Company to the Legislatures of Massachusetts and Rhode Island.

At a meeting of the Commissioners of the Providence and Worcester Railroad Company, at the Company's office, in Providence, on the fourteenth day of October, 1870, for the purpose of investigating the accounts of the expenditures of said Company, and for deciding what are the sums applicable to that part of the road lying in the State of Rhode Island, and also what is chargeable to that portion of the road lying in Massachusetts; and having examined the accounts of said Company, we find that the net expenditures for construction and equipment, to the thirtieth day of November, 1869, were \$2,083,772 18

To which add for purchase of real estate, new depots and other build-

ings, and second track, \$60,276 79

For purchase of new cars and locomotives, 34,236 57

94,513 36

\$2,128,285 54

Apportioned as follows, viz. :—

To Rhode Island, \$1,109,753 95

To Massachusetts, 1,018,531 59

The whole amount of receipts, from November 30, 1869, to September 30, 1870, is as follows, viz. :—

Transportation of passengers, \$280,174 41

Transportation of freight, 365,290 83

Transportation of mails, 4,140 74

Rents, 2,692 01

Express, 9,418 68

\$661,716 67

Expenses for maintaining and operating the road during the ten months ending September 30, 1870 :—

Fuel, \$55,153 83

Oil, 5,525 65

Maintenance of way, 113,364 38

Repairs of cars, 51,300 00

Repairs of locomotives, 40,740 00

Passenger expenses, 43,624 26

Freight expenses, 89,970 16

Miscellaneous, 68,227 49

Interest, 4,656 54

472,562 81

Net earnings, \$189,154 36

Which we apportion as follows, viz. :—

To Rhode Island, \$94,577 18

To Massachusetts, 94,577 18

Said Commissioners also find, on the examination of the books of said Company, that separate accounts of the expenditures in Rhode Island and Massachusetts have been kept, agreeably to the Acts of said States creating the present Providence and Worcester Railroad Company.

HARTLEY WILLIAMS,

Commissioner of Massachusetts.

JOHN R. BARTLETT,

Commissioner of Rhode Island.

R E P O R T

OF THE

SALEM AND LOWELL RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$400,000 00
2. Number of shares of capital stock issued,	2,433	
3. Increase of capital since last report,	None.	
4. Capital paid in, per last report,	\$243,305 00	
5. Capital paid in since last report,	None.	
6. Total amount of capital stock paid in,		243,305 00
7. Amount realized in cash value for stock issued,	240,322 66	
8. Funded debt, per last report,	226,900 00	
9. Funded debt paid since last report,	None.	
10. Funded debt, increase of, since last report,	None.	
11. Total present amount of funded debt,		226,900 00
12. Floating debt, per last report,	353 45	
13. Floating debt paid since last report,	None.	
14. Floating debt, increase of, since last report,	934 11	
15. Total present amount of floating debt, [dividends and taxes,]		1,287 56
16. Total present amount of funded and floating debt,		228,187 56
17. Whole amount in cash value realized from funded and floating debts,	146,050 00	
18. Whole amount in cash value realized from stock and debts,	386,372 66	
19. Average rate of interest per annum paid during the year,	6 per cent on bonds.	
20. Maximum amount of debts during the year,	228,187 56	
		471,492 56
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry per last report,	\$94,831 77	
22. For graduation and masonry, paid during the past year,	Nothing.	
23. Total am't expended for graduation and masonry,		\$94,831 77
24. For wooden bridges, per last report,	3,139 15	
25. For wooden bridges paid during the past year,	Nothing.	
26. Total amount expended for wooden bridges,		3,139 15
27. Total amount expended for iron bridges, (if any,)	Nothing.	
28. For superstructure, including iron, per last report,	123,801 18	
29. For superstructure, including iron paid during the past year,	Nothing.	
30. Total amount expended for superstructure, including iron,		123,801 18
31. For stations, buildings and fixtures, per last report,	8,399 13	
32. For stations, buildings and fixtures paid during the past year,	Nothing.	

33. Total amount expended for stations, buildings and fixtures,		\$8,399 13
34. For land, land-damages and fences, per last report,	\$48,007 25	
35. For land, land-damages and fences paid during the past year,	Nothing.	
36. Total amount expended for land, land-damages, and fences,		48,007 25
37. For locomotives, per last report,	21,948 55	
38. For locomotives paid during the past year,	Nothing.	
39. Total amount expended for locomotives,		21,948 55
40. For passenger and baggage cars, per last report,	7,420 62	
41. For passenger and baggage cars paid during the past year,	Nothing.	
42. Total amount expended for passenger and baggage cars,		7,420 62
43. For merchandise cars, per last report,	53,174 22	
44. For merchandise cars paid during the past year,	Nothing.	
45. Total amount expended for merchandise cars,		53,174 22
46. For engineering, per last report,	6,927 57	
47. For engineering paid during the past year,	Nothing.	
48. Total amount expended for engineering,		6,927 57
49. For agencies and other expenses, per last report,	6,026 35	
50. For agencies and other expenses, paid during the past year,	Nothing.	
51. Total amount expended for agencies and other expenses,		6,026 35
52. Amounts of discounts or other sacrifices on stock and bonds issued,	95,293 05	
53. Total cost of road and equipment,		468,968 84
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, \$2,523.72; stocks and bonds, [Nothing;] real estate, [Nothing;] fuel, [Nothing,]	2,523 72	471,492 56
55. Income expended in construction and equipment,	82,596 38	
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	16.882 miles.	
57. Length of main road in other States, (specifying how much in each,)	None.	
58. Length of single main track,	16.882 miles.	
59. Length of double main track,	None.	
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	None.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	2.598 miles.	
62. Length of roads belonging to other companies operated by this Company,	None.	
63. Total miles of road operated by this Company,	None.	
64. Weight of rail, per yard, in main road,	58 lbs.; renewals, 60 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	None.	
66. Maximum grade, with its length, in main road,	28.58 for 3,380 feet.	
67. Maximum grade, with its length, in branch roads,	None.	
68. Total rise and fall in main road,	223.34 feet.	
69. Total rise and fall in branch roads,	None.	
70. Shortest radius of curvature, with length of curve, in main road,	1,200 for 1,425 feet.	
71. Shortest radius of curvature, with length of curve, in branch roads,	None.	

72. Total degrees of curvature in main road, . . .	395°
73. Total degrees of curvature in branch roads, . . .	None.
74. Total length of straight line in main road, . . .	13.868
75. Total length of straight line in branches, . . .	None.
76. Aggregate length of wooden truss bridges, . . .	None.
77. Aggregate length of all other wooden bridges, . . .	121
78. Aggregate length of iron bridges, . . .	None.
79. Whole length of road unfenced on both sides, . . .	{ All fenced or otherwise protected.
80. Number of public ways crossed at grade, . . .	19
81. Number of railroads crossed at grade, . . .	2
82. Remarks, . . .	-
83. Way stations for express trains, . . .	None.
84. Way stations for accommodation trains, . . .	4
85. Flag stations, . . .	7
86. Whole number of way stations, . . .	4
87. Whole number of flag stations, . . .	7

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains, . . .	} Operated by the Boston and Lowell Railroad Corporation, under a contract. A copy is annexed to the report of 1858.
89. Miles run by freight trains, . . .	
90. Miles run by other trains, . . .	
91. Total miles run, . . .	
92. Number of passengers carried in the cars, . . .	
93. Number of passenger carried one mile, . . .	
94. Number of tons of merchandise carried in the cars, . . .	
95. Number of tons of merchandise carried one mile, . . .	
96. Number of passengers carried one mile, to and from other roads, . . .	
97. Number of tons carried one mile, to and from other roads, . . .	
98. Rate of speed adopted for express passenger trains, including stops, . . .	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions, . . .	
100. Rate of speed adopted for accommodation trains, . . .	
101. Rate of speed actually attained by accommodation trains, including stops and detentions, . . .	
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	
103. Average rate of speed adopted for freight trains, including stops, . . .	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile, . . .	}
105. Estimated weight in tons of merchandise cars (not including freight,) hauled one mile, . . .	

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron, . . .	} Paid by the Boston and Lowell Railroad Corporation.
107. For repairs of wooden bridges, . . .	
108. For wages of switchmen, average per month, . . . \$	
109. For wages of gate-keepers, average per month, . . .	
110. For wages of signal-men, average per month, . . .	
111. For wages of watchmen, average per month, . . .	

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

112. Number of men employed, exclusive of those engaged in construction,		
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)		
114. For repairs of fences, gates, houses for signalmen, gate-keepers, switchmen, tool-houses,		
115. Total for maintenance of way,		
MOTIVE POWER AND CARS.		
116. For repairs of locomotives,		
117. For new locomotives, to cover depreciation,		
118. For repairs of passenger cars,		
119. For new passenger cars, to cover depreciation,		
120. For repairs of merchandise cars,		
121. For new merchandise cars, to cover depreciation,		
122. For repairs of gravel and other cars,		
123. Total for maintenance of motive power and cars,		
124. Number of engines,		
125. Number of passenger cars,		
126. Number of baggage cars,		
127. Number of merchandise cars,		
128. Number of gravel cars,		
MISCELLANEOUS.*		
129. For fuel used by engines during the year, viz. :—		
1. Wood, number of cords, Cost of the same,		
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) Cost of same,		
130. For oil used by cars and engines,		
131. For waste and other material for cleaning,		
132. For salaries, wages and incidental expenses, chargeable to passenger department,		
133. For salaries, wages and incidental expenses, chargeable to freight department,		
134. For gratuities and damages,		
135. For taxes and insurance,		
136. For ferries,		
137. For repairs of station buildings, aqueducts, fixtures, furniture,		
138. For renewals of iron, including laying down,		
139. For new iron laid down, deducting the value of old iron taken up,		
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,		
141. For amount paid other companies, as rent for use of their roads, specifying each company,		
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	114 21	
143. Total miscellaneous,		\$957 04
144. Total expenditures for working the road,	957 04	
145. Total amount of interest paid during the year,		11,345 00
		<hr/> \$12,302 04

Paid by the Boston and Lowell Railroad Corporation.

Run by the Boston and Lowell Railroad Corporation.

Operated by the Boston and Lowell Railroad Corporation.

\$842 83

Operated by the Boston and Lowell Railroad Corporation.

* See note on preceding page.

INCOME DURING THE YEAR.*		
146. <i>For Passengers</i> :—		
1. On main road, including branches owned by company,		Operated by the Boston and Lowell Railroad Corporation, under a contract which pays \$17,600 per annum.
2. To and from other roads, specifying what,		
147. <i>For Freight</i> :—		
1. On main road, and branches owned by Co.,		
2. To and from other connecting roads,		
148. U. S. mails,		
149. Rents,		
150. Total income,		\$15,517 79
151. Net earnings, after deducting expenses,	\$3,215 75	
DIVIDENDS.		
152. 14-10 per cent. Total,		\$3,406 20
153. Surplus not divided, [deficit],	\$190 45	
154. Surplus last year, [deficit],	90 61	
155. Total surplus,, [deficit],		280 96
cash and loans, [on hand], \$2,523.72; stocks and bonds, [None;] real estate, [None;] fuel, [None;]		
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—		
156. Of road and bridges,		Road run and kept in repair by the Boston and Lowell Railroad Corporation.
157. Buildings,		
158. Engines and cars,		
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage, of road and franchise or any property of the Corporation, per last report,	\$226,900 00	
160. Mortgage debt paid since last report,	None.	
161. Increase of mortgage debt since last report,	None.	
162. Present amount of mortgage debts,	226,900 00	
163. Number of mortgages, on road and franchise or any property of the Corporation,	One.	

ACCIDENTS.

April 28, 1870.—C. H. Nowell, an employé, while coupling cars at Salem, was injured.

June 16.—Michael Whelan was thrown from a freight train at Salem and instantly killed.

F. B. CROWNINSHIELD,
J. G. ABBOTT,
H. HOSFORD,
EDWARD W. CODMAN,

Directors of the Boston and Lowell Railroad Corporation.

SUFFOLK, ss. November 18, 1870. Then personally appeared F. B. Crowninshield, J. G. Abbott and Edward W. Codman, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

C. E. A. BARTLETT, *Justice of the Peace.*

SUFFOLK, ss. November 19, 1870. Then personally appeared H. Hosford and made oath to the truth of the foregoing statement by him subscribed.

Before

C. E. A. BARTLETT, *Justice of the Peace.*

REPORT

OF THE

SOUTH READING BRANCH RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	\$300,000 00	
2. Number of shares of capital stock issued,	2,088	
3. Increase of capital since last report,	None.	
4. Capital paid in, per last report,	209,532 73	
5. Capital paid in since last report,	Nothing.	
6. Total amount of capital stock paid in,	\$209,532 73	
7. Amount realized in cash value for stock issued,	209,532 73	
8. Funded debt, per last report,	Nothing.	
9. Funded debt paid since last report,	Nothing.	
10. Funded debt, increase of, since last report,	Nothing.	
11. Total present amount of funded debt,	Nothing.	
12. Floating debt, per last report,	\$5,547 25	
13. Floating debt paid since last report,	Nothing.	
14. Floating debt, increase of, since last report,	Nothing.	
15. Total present amount of floating debt,	95,547 25	
16. Total present amount of funded and floating debt,		
17. Whole amount in cash value realized from funded and floating debts,	} In No. 15.	
18. Whole amount in cash value realized from stock and debts,		
19. Average rate of interest per annum paid during the year,	Nothing.	
20. Maximum amount of debts during the year,	95,547 25	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$103,936 88	
22. For graduation and masonry paid during the past year,	Nothing.	
23. Total am't expended for graduation and masonry,	\$103,936 88	
24. For wooden bridges, per last report,	585 73	
25. For wooden bridges paid during the past year,	Nothing.	
26. Total amount expended for wooden bridges,	585 73	
27. Total amount expended for iron bridges, (if any,)	-	
28. For superstructure, including iron, per last report,	61,539 27	
29. For superstructure, including iron, paid during the past year,	Nothing.	
30. Total amount expended for superstructure, including iron,	61,539 27	
31. For stations, buildings and fixtures, per last report,	9,303 03	
32. For stations, buildings and fixtures paid during the past year,	Nothing.	

83. Total amount expended for stations, buildings and fixtures,		\$9,303 03
84. For land, land-damages and fences, per last report,	\$50,507 80	
85. For land, land-damages and fences paid during the past year,	Nothing.	
86. Total amount expended for land, land-damages and fences,		50,507 80
87. For locomotives, per last report,	} Owns no equipment.	
88. For locomotives paid during the past year,		
89. Total amount expended for locomotives,		
90. For passenger and baggage cars, per last report,		
91. For passenger and baggage cars paid during the past year,		
92. Total amount expended for passenger and baggage cars,		
93. For merchandise cars, per last report,		
94. For merchandise cars paid during the past year,		
95. Total amount expended for merchandise cars,		
96. For engineering, per last report,	7,404 57	
97. For engineering paid during the past year,	Nothing.	
98. Total amount expended for engineering,		7,404 57
99. For agencies and other expenses, per last report,	66,191 08	
100. For agencies and other expenses paid during the past year,	Nothing.	
101. Total amount expended for agencies and other expenses,		66,191 08
102. Amounts of discounts or other sacrifices on stock and bonds issued,	Nothing.	
103. Total cost of road and equipment,		299,468 36
104. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, ; stocks and bonds, ; real estate, ; fuel,	-	-
105. Income expended in construction and equipment,	Nothing.	
CHARACTERISTICS OF ROAD.		
106. Length of main road in this State,	8.15 miles.	
107. Length of main road in other States, (specifying how much in each,)	Nothing.	
108. Length of single main track,	8.15 miles.	
109. Length of double main track,	None.	
110. Length of branches owned by the Company, stating whether they have a single or double track, and specifying length in this State, and in each other State,) [in Mass.,]	1,150 feet, single track.	
111. Aggregate length of sidings, and other tracks, excepting main track and branches,	-	-
112. Length of roads belonging to other companies operated by this Company,	None.	
113. Total miles of road operated by this Company,	8.15 miles.	
114. Weight of rail, per yard, in main road,	60 lbs.	
115. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	60 lbs.	
116. Maximum grade, with its length, in main road,	2,200 feet length; 52.8 feet.	
117. Maximum grade, with its length, in branch roads,	900 feet length; 40 feet.	
118. Total rise and fall in main road,	237.6 feet.	
119. Total rise and fall in branch roads,	5 feet.	
120. Shortest radius of curvature, with length of curve, in main road,	425 feet length; 290 feet.	
121. Shortest radius of curvature, with length of curve, in branch roads,	350 feet length; 100 feet.	
122. Total degrees of curvature in main road,	232° 15'	

73. Total degrees of curvature in branch roads, . . .	80° 41'
74. Total length of straight line in main road, . . .	6.85 miles.
75. Total length of straight line in branches, . . .	578 feet.
76. Aggregate length of wooden truss bridges, . . .	326 feet.
77. Aggregate length of all other wooden bridges, . . .	None.
78. Aggregate length of iron bridges, . . .	None.
79. Whole length of road unfenced on both sides, . . .	None.
80. Number of public ways crossed at grade, . . .	12
81. Number of railroads crossed at grade, . . .	None.
82. Remarks, . . .	None.
83. Way stations for express trains, . . .	None.
84. Way stations for accommodation trains, . . .	2
85. Flag stations, . . .	4
86. Whole number of way stations, . . .	2
87. Whole number of flag stations, . . .	4
DOINGS DURING THE YEAR.*	
88. Miles run by passenger trains, . . .	20,880
89. Miles run by freight trains, . . .	} None run.
90. Miles run by other trains, . . .	
91. Total miles run, . . .	20,880
92. Number of passengers carried in the cars, . . .	17,987
93. Number of passengers carried one mile, . . .	128,216
94. Number of tons of merchandise carried in the cars, . . .	19,593
95. Number of tons of merchandise carried one mile, . . .	67,444
96. Number of passengers carried one mile, to and from other roads, . . .	89,595
97. Number of tons carried one mile, to and from other roads, . . .	33,033
98. Rate of speed adopted for express passenger trains, including stops, . . .	None run.
99. Average rate of speed actually attained by express passenger trains, including stops and detentions, . . .	None run.
100. Rate of speed adopted for accommodation trains, . . .	21 miles per hour.
101. Rate of speed actually attained by accommodation trains, including stops and detentions, . . .	20 miles per hour.
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	None run.
103. Average rate of speed adopted for freight trains, including stops, . . .	None run.
104. Estimated weight, in tons, of passenger cars (not including passengers) hauled one mile, . . .	21,370
105. Estimated weight, in tons, of merchandise cars, (not including freight) hauled one mile, . . .	- - -
EXPENDITURES FOR WORKING THE ROAD.*	
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron, . . .	\$1,765 84
107. For repairs of wooden bridges, . . .	Nothing.
108. For wages of switchmen, average per month, . . .	} Total. \$636 60
109. For wages of gate-keepers, average per month, . . .	
110. For wages of signal-men, average per month, . . .	
111. For wages of watchmen, average per month, . . .	
112. Number of men employed, exclusive of those engaged in construction, . . .	
	14

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	Nothing.	
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,	Nothing.	
115. Total for maintenance of way,		\$2,402 44

MOTIVE POWER AND CARS.

116. For repairs of locomotives,	\$1,908 00	
117. For new locomotives, to cover depreciation,	Nothing.	
118. For repairs of passenger cars,	1,484 00	
119. For new passenger cars, to cover depreciation,	Nothing.	
120. For repairs of merchandise cars,	Nothing.	
121. For new merchandise cars, to cover depreciation,	Nothing.	
122. For repairs of gravel and other cars,	Nothing.	
123. Total for maintenance of motive power and cars,		\$3,392 00
124. Number of engines,	} Owns no equipment.	
125. Number of passenger cars,		
126. Number of baggage cars,		
127. Number of merchandise cars,		
128. Number of gravel cars,		

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz. :—		
1. Wood, number of cords, . . . Cost of the same,	Nothing.	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 205. . . Cost of same,	\$1,636 00	
130. For oil used by cars and engines, [and for,]	} 195 60	
131. For waste and other material for cleaning,		
132. For salaries, wages, and incidental expenses, chargeable to passenger department,	7,544 78	
133. For salaries, wages, and incidental expenses, chargeable to freight department,	Nothing.	
134. For gratuities and damages,	Nothing.	
135. For taxes and insurance,	Nothing.	
136. For ferries,	Nothing.	
137. For repairs of station buildings, aqueducts, fixtures, furniture,	1,505 54	
138. For renewals of iron, including laying down,	Nothing.	
139. For new iron laid down, deducting the value of old iron taken up,	Nothing.	
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	Nothing.	
141. For amount paid other companies, as rent for use of their roads, specifying each company, [Eastern Railroad,]	2,666 67	
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	Nothing.	
143. Total miscellaneous,		\$13,548 59
144. Total expenditures for working the road,		19,343 03
145. Total amount of interest paid during the year,	Nothing.	

* See note on preceding page.

INCOME DURING THE YEAR.*	
146. <i>For Passengers</i> :—	
1. On main road, including branches owned by company,	} \$5,533 39
2. To and from other roads, specifying what,	
147. <i>For Freight</i> :—	
1. On main road, and branches owned by company,	} 5,613 28
2. To and from other connecting roads,	
148. U. S. mails,	Nothing.
149. Rents,	Nothing.
150. Total income, [less U. S. tax, \$163.87,]	\$10,992 80
151. Net earnings, after deducting expenses, [loss,]	8,350 23
DIVIDENDS.	
152. per cent. Total,	} Nothing.
153. Surplus not divided,	
154. Surplus last year,	
155. Total surplus; cash and loans, ; stocks and bonds, ; real estate, fuel,	
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ.:—	
156. Of road and bridges,	} Nothing.
157. Buildings,	
158. Engines and cars,	
MORTGAGE DEBTS.	
159. Amount of debts secured by mortgage of road and franchise, or any property of the corporation, per last report,	} Nothing.
160. Mortgage debt paid since last report,	
161. Increase of mortgage debt since last report,	
162. Present amount of mortgage debts,	
163. Number of mortgages on road and franchise, or any property of the corporation,	None.

GEORGE M. BROWNE,
HENRY L. WILLIAMS,
FRANKLIN HAVEN,
BENJ. E. BATES,
S. HOOPER,
N. THAYER,
ICHABOD GOODWIN,

Directors of the South Reading Branch Railroad Corporation.

SUFFOLK, ss. October 26, 1870. Then personally appeared George M. Browne, Henry L. Williams, Franklin Haven, Benj. E. Bates, S. Hooper, N. Thayer, and Ichabod Goodwin, and severally made oath to the truth of the foregoing statement by them subscribed, according to their best knowledge and belief.

Before

JOHN B. PARKER, *Justice of the Peace.*

REPORT

OF THE

SOUTH SHORE RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	\$600,000 00
2. Number of shares of capital stock issued,	10,000
3. Increase of capital, since last report,	-
4. Capital paid in, per last report,	\$259,685 00
5. Capital paid in, since last report,	-
6. Total amount of capital stock paid in,	259,685 00
7. Amount realized in cash value for stock issued,	259,685 00
8. Funded debt, per last report,	150,000 00
9. Funded debt, paid since last report,	-
10. Funded debt, increase of, since last report,	-
11. Total present amount of funded debt,	150,000 00
12. Floating debt, per last report,	7,943 85
13. Floating debt, paid since last report,	7,943 85
14. Floating debt, increase of, since last report,	-
15. Total present amount of floating debt,	-
16. Total present amount of funded and floating debt,	150,000 00
17. Whole amount in cash value realized from funded and floating debts,	150,000 00
18. Whole amount in cash value realized from stock and debts,	417,632 85
19. Average rate of interest per annum paid during the year,	6 per cent.
20. Maximum amount of debts during the year,	157,943 85
COST OF ROAD AND EQUIPMENT.	
21. For graduation and masonry, per last report,	\$125,382 06
22. For graduation and masonry, paid during the past year,	-
23. Total am't expended for graduation and masonry,	\$125,382 06
24. For wooden bridges, per last report,	13,448 80
25. For wooden bridges, paid during the past year,	-
26. Total amount expended for wooden bridges,	13,448 80
27. Total amount expended for iron bridges, (if any,)	-
28. For superstructure, including iron, per last report,	82,063 10
29. For superstructure, including iron, paid during the past year,	-
30. Total amount expended for superstructure, including iron,	82,063 10
31. For stations, buildings and fixtures, per last report,	29,529 82
32. For stations, buildings and fixtures, paid during the past year,	-

33. Total amount expended for stations, buildings and fixtures,		\$29,529 82
34. For land, land-damages and fences, per last report,	\$101,977 56	
35. For land, land-damages and fences, paid during the past year,	-	-
36. Total amount expended for land, land-damages and fences,		101,977 56
37. For locomotives, per last report,	15,600 50	
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,		15,600 50
40. For passenger and baggage cars, per last report,	17,026 19	
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,		17,026 19
43. For merchandise cars, per last report,	6,799 34	
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,		6,799 34
46. For engineering, per last report,	18,402 81	
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		18,402 81
49. For agencies and other expenses, per last report,	96,863 08	
50. For agencies and other expenses, paid during the past year,	-	-
51. Total amount expended for agencies and other expenses,		96,863 08
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,		501,592 96
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, \$1,642.17; stocks and bonds,; real estate,; fuel, \$2,419.25,	-	-
55. Income expended in construction and equipment,	-	-
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	11 5-10 miles.	
57. Length of main road in other States, (specifying how much in each,)	-	-
58. Length of single main track,	11 5-10 miles.	
59. Length of double main track,	-	-
60. Length of branches owned by the Company, stating whether they have a single or double track, and specifying length in this State, and in each other State,)	-	-
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	10,377 feet.	
62. Length of roads belonging to other companies operated by this Company,	-	-
63. Total miles of road operated by this Company,	11 5-10 miles.	
64. Weight of rail, per yard, in main road,	52 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	-	
66. Maximum grade, with its length, in main road,	34 85-100 ft. for 3½ miles.	
67. Maximum grade, with its length, in branch roads,	-	
68. Total rise and fall in main road,	259 4-10 feet.	
69. Total rise and fall in branch roads,	-	-
70. Shortest radius of curvature, with length of curve, in main road,	} 447½ ft. for 697½ ft. at junction O. C. & N. R. Co.	
71. Shortest radius of curvature, with length of curve, in branch roads,		
72. Total degrees of curvature in main road,	702° 42''	

73. Total degrees of curvature, in branch roads, . . .	-	-
74. Total length of straight line, in main road, . . .	7 8-10 miles.	-
75. Total length of straight line, in branches, . . .	-	-
76. Aggregate length of wooden truss bridges, . . .	50 feet.	-
77. Aggregate length of all other wooden bridges, . . .	1,176 feet.	-
78. Aggregate length of iron bridges, . . .	-	-
79. Whole length of road unfenced on both sides, . . .	$\frac{1}{2}$ mile.	-
80. Number of public ways crossed at grade, . . .	26	-
81. Number of railroads crossed at grade, . . .	-	-
82. Remarks, . . .	-	-
83. Way stations for express trains, . . .	-	-
84. Way stations for accommodation trains, . . .	8	-
85. Flag stations, . . .	2	-
86. Whole number of way stations, . . .	8	-
87. Whole number of flag stations, . . .	2	-
DOINGS DURING THE YEAR.* [10 Mos.]		
88. Miles run by passenger trains, . . .	44,055	-
89. Miles run by freight trains, . . .	6,942	-
90. Miles run by other trains, . . .	-	-
91. Total miles run, . . .	-	50,997
92. Number of passengers carried in the cars, . . .	171,728	-
93. Number of passengers carried one mile, . . .	1,463,097	-
94. Number of tons of merchandise carried in the cars, . . .	11,285	-
95. Number of tons of merchandise carried one mile, . . .	115,070	-
96. Number of passengers carried one mile, to and from other roads, . . .	1,817,693	-
97. Number of tons carried one mile, to and from other roads, . . .	103,737	-
98. Rate of speed adopted for express passenger trains, including stops, . . .	-	-
99. Average rate of speed actually attained by express passenger trains, including stops and detentions, . . .	-	-
100. Rate of speed adopted for accommodation trains, . . .	22 miles per hour.	-
101. Rate of speed actually attained by accommodation trains, including stops and detentions, . . .	22 miles per hour.	-
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	-	-
103. Average rate of speed adopted for freight trains, including stops, . . .	-	-
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile, . . .	-	-
105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile, . . .	-	-
EXPENDITURES FOR WORKING THE ROAD.*		
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron, . . .	\$8,144 80	-
107. For repairs of wooden bridges, . . .	280 07	-
108. For wages of switchmen, average per month, . . .	\$	-
109. For wages of gate-keepers, average per month, . . .	11 28 7-10	-
110. For wages of signal-men, average per month, . . .	-	112 87
111. For wages of watchmen, average per month, . . .	45 60	-
Total,		456 00

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

112. Number of men employed, exclusive of those engaged in construction,	36		
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	-	-	
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,	\$254	12	
115. Total for maintenance of way,			\$9,247 86
MOTIVE POWER AND CARS.			
116. For repairs of locomotives,	\$789	69	
117. For new locomotives, to cover depreciation,	-	-	
118. For repairs of passenger cars,	5,887	49	
119. For new passenger cars to cover depreciation,	-	-	
120. For repairs of merchandise cars,	602	93	
121. For new merchandise cars to cover depreciation,	-	-	
122. For repairs of gravel and other cars,	-	-	
123. Total for maintenance of motive power and cars,			\$7,280 11
124. Number of engines,	3		
125. Number of passenger cars,	12		
126. Number of baggage cars,	2		
127. Number of merchandise cars,	8		
128. Number of gravel cars,	7		
MISCELLANEOUS.*			
129. For fuel used by engines during the year, [10 mos.,] viz. :—			
1. Wood, number of cords, 53½. Cost of the same,	\$624	62	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 654½. Cost of the same,	5,720	35	
130. For oil used by cars and engines,	1,005	09	
131. For waste and other material for cleaning,	208	02	
132. For salaries, wages and incidental expenses, chargeable to passenger department,	9,452	62	
133. For salaries, wages and incidental expenses, chargeable to freight department,	2,004	29	
134. For gratuities and damages,	144	63	
135. For taxes and insurance,	1,880	21	
136. For ferries,	-	-	
137. For repairs of station buildings, aqueducts, fixtures, furniture,	2,033	77	
138. For renewals of iron, including laying down,	-	-	
139. For new iron laid down, deducting the value of old iron taken up,	3,055	52	
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	-	-	
141. For amount paid other companies, as rent for use of their roads, specifying each company,	-	-	
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	578	41	
143. Total miscellaneous,			\$26,707 53
144. Total expenditures for working the road,			43,285 50
145. Total amount of interest paid during the year, [10 mos.,]			9,004 50

* See note on preceding page.

INCOME DURING THE YEAR.* [10 MONTHS.]		
146. For Passengers:—		
1. On main road, including branches owned by company,	\$51,242 69	
2. To and from other roads, specifying what,	—	—
147. For Freight:—		
1. On main road and branches owned by Co.,	7,852 42	
2. To and from other connecting roads,	—	—
148. United States mails,	1,282 40	
[Expresses,]	1,342 40	
149. Rents,	428 11	
[Miscellaneous income, extra baggage, &c.,]	21 12	
150. Total income,		\$62,1
151. Net earnings, after deducting expenses,	9,929 14	
DIVIDENDS.		
152. per cent. Total,	—	—
153. Surplus not divided,	—	—
154. Surplus last year,	—	—
155. Total surplus; cash and loans,		
stocks and bonds,; real estate,		
fuel,	—	—
[Sinking fund,]	\$24,807 33	
ESTIMATED DEPRECIATION BEYOND THE RENEWALS,		
VIZ.:		
156. Of road and bridges,	—	—
157. Buildings,	—	—
158. Engines and cars,	—	—
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage, of road and franchise or any property of the corporation, per last report,	\$150,000 00	
160. Mortgage debt paid since last report,	—	—
161. Increase of mortgage debt since last report,	—	—
162. Present amount of mortgage debts,	—	—
163. Number of mortgages, on road and franchise or any property of the corporation,	One.	

ONSLOW STEARNS,
URIEL CROCKER,
JOHN W. LOUD,

Directors of the South Shore Railroad Corporation

SUFFOLK, ss. November 2, 1870. Then personally appeared Onslow Stearns, Uriel Crocker, John W. Loud, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

JOHN M. WASHBURN, *Justice of the Peace*

STOCKBRIDGE AND PITTSFIELD R. R. CORPORATION.

[The Report of this Railroad (not received at date of printing), will be found on a subsequent page. See Index.]

STONEHAM BRANCH RAILROAD CORPORATION.

[The Report of this Railroad (not received at date of printing), will be found subsequent page. See Index.]

REPORT

OF THE

STONY BROOK RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$300,000 00
2. Number of shares of capital stock issued,	2,673	
3. Increase of capital since last report,	—	—
4. Capital paid in, per last report,	\$267,300 00	
5. Capital paid in since last report,	—	—
6. Total amount of capital stock paid in,		267,300 00
7. Amount realized in cash value for stock issued,	267,300 00	
8. Funded debt, per last report,	Nothing.	
9. Funded debt paid since last report,	Nothing.	
10. Funded debt, increase of, since last report,	Nothing.	
11. Total present amount of funded debt,	Nothing.	
12. Floating debt, per last report,	Nothing.	
13. Floating debt paid since last report,	Nothing.	
14. Floating debt, increase of, since last report,	Nothing.	
15. Total present amount of floating debt,	Nothing.	
16. Total present amount of funded and floating debt,	Nothing.	
17. Whole amount in cash value realized from funded and floating debts,	Nothing.	
18. Whole amount in cash value realized from stock and debts,	Nothing.	
19. Average rate of interest per annum paid during the year,	Nothing.	
20. Maximum amount of debts during the year,	Nothing.	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$82,898 72	
22. For graduation and masonry paid during the past year,	Nothing.	
23. Total am't expended for graduation and masonry,		\$82,898 72
24. For wooden bridges, per last report,	3,600 03	
25. For wooden bridges paid during the past year,	Nothing.	
26. Total amount expended for wooden bridges,		3,600 03
27. Total amount expended for iron bridges, (if any,)	Nothing.	
28. For superstructure, including iron, per last report,	118,197 05	
29. For superstructure, including iron, paid during the past year,	Nothing.	
30. Total amount expended for superstructure, including iron,		118,197 05
31. For stations, buildings and fixtures, per last report,	11,462 51	
32. For stations, buildings and fixtures, paid during the past year,	Nothing.	

33. Total amount expended for stations, buildings and fixtures,		\$11,46
34. For land, land-damages and fences, per last report,	\$25,654 84	
35. For land, land-damages and fences paid during the past year,	Nothing.	
36. Total amount expended for land, land-damages, and fences,		25,65
37. For locomotives, per last report,	-	-
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,	-	-
40. For passenger and baggage cars, per last report,	-	-
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,	-	-
43. For merchandise cars, per last report,	-	-
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,	-	-
46. For engineering, per last report,	8,249 72	
47. For engineering paid during the past year,	Nothing.	
48. Total amount expended for engineering,		8,24
49. For agencies and other expenses, per last report,	17,320 70	
50. For agencies and other expenses paid during the past year,	Nothing.	
51. Total amount expended for agencies and other expenses,		17,32
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,	267,383 57	
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans,; stocks and bonds,; real estate,; fuel,	-	-
55. Income expended in construction and equipment,	-	-
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	13 16-100 miles.	
57. Length of main road in other States, (specifying how much in each,)	Nothing.	
58. Length of single main track,	13 16-100 miles.	
59. Length of double main track,	Nothing.	
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	Nothing.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	4,949 feet.	
62. Length of road belonging to other companies, operated by this Company,	Nothing.	
63. Total miles of road operated by this Company,	None.	
64. Weight of rail, per yard, in main road,	56 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	Nothing.	
66. Maximum grade, with its length, in main road,	39 61-100 ft., 1 36-100	
67. Maximum grade, with its length, in branch roads,	Nothing.	
68. Total rise and fall in main road,	207 59-100 feet.	
69. Total rise and fall in branch roads,	Nothing.	
70. Shortest radius of curvature, with length of curve, in main road,	955 21-100 feet.	
71. Shortest radius of curvature, with length of curve in branch roads,	Nothing.	
72. Total degrees of curvature, in main road,	612°	

73. Total degrees of curvature, in branch roads, . . .	Nothing.
74. Total length of straight line, in main road, . . .	8 59-100 miles.
75. Total length of straight line, in branches, . . .	Nothing.
76. Aggregate length of wooden truss bridges, . . .	Nothing.
77. Aggregate length of all other wooden bridges, . . .	510 feet.
78. Aggregate length of iron bridges, . . .	Nothing.
79. Whole length of road unfenced on both sides, . . .	Nothing.
80. Number of public ways crossed at grade, . . .	13
81. Number of railroads crossed at grade, . . .	1
82. Remarks, . . .	None.
83. Way stations for express trains, . . .	None.
84. Way stations for accommodation trains, . . .	4
85. Flag stations, . . .	4
86. Whole number of way stations, . . .	4
87. Whole number of flag stations, . . .	4

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains, . . .	Operated by the Nashua and Lowell Railroad.
89. Miles run by freight trains, . . .	
90. Miles run by other trains, . . .	
91. Total miles run, . . .	
92. Number of passengers carried in the cars, . . .	
93. Number of passengers carried one mile, . . .	
94. Number of tons of merchandise carried in the cars, . . .	
95. Number of tons of merchandise carried one mile, . . .	
96. Number of passengers carried one mile, to and from other roads, . . .	
97. Number of tons carried one mile, to and from other roads, . . .	
98. Rate of speed adopted for express passenger trains, including stops, . . .	Reported by the Nashua and Lowell Railroad.
99. Average rate of speed actually attained by ex- press passenger trains, including stops and de- tentions, . . .	
100. Rate of speed adopted for accommodation trains, . . .	
101. Rate of speed actually attained by accommoda- tion trains, including stops and detentions, . . .	
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	
103. Average rate of speed adopted for freight trains, including stops, . . .	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile, . . .	
105. Estimated weight in tons of merchandise cars (not including freight,) hauled one mile, . . .	

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclu- sive of wooden bridges, and renewals of iron, . . .
107. For repairs of wooden bridges, . . .
108. For wages of switchmen, average per month, . . . \$
109. For wages of gate-keepers, average per month, . . .
110. For wages of signal-men, average per month, . . .
111. For wages of watchmen, average per month, . . .

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

112. Number of men employed, exclusive of those engaged in construction,
 113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)
 114. For repairs of fences, gates, houses for signalmen, gate-keepers, switchmen, tool-houses,
 115. Total for maintenance of way,

Reported by the Nash
and Lowell Railroad.

MOTIVE POWER AND CARS.

116. For repairs of locomotives,
 117. For new locomotives, to cover depreciation,
 118. For repairs of passenger cars,
 119. For new passenger cars, to cover depreciation,
 120. For repairs of merchandise cars,
 121. For new merchandise cars, to cover depreciation,
 122. For repairs of gravel and other cars,
 123. Total for maintenance of motive power and cars,
 124. Number of engines,
 125. Number of passenger cars,
 126. Number of baggage cars,
 127. Number of merchandise cars,
 128. Number of gravel cars,

Reported by the Nash
and Lowell Railroad.

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz. :—
 1. Wood, No. of cords, Cost of the same,
 2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) Cost of the same,
 130. For oil used by cars and engines,
 131. For waste and other material for cleaning,
 132. For salaries, wages and incidental expenses, chargeable to passenger department,
 133. For salaries, wages and incidental expenses, chargeable to freight department,
 134. For gratuities and damages,
 135. For taxes and insurance,
 136. For ferries,
 137. For repairs of station buildings, aqueducts, fixtures, furniture,
 138. For renewals of iron, including laying down,
 139. For new iron laid down, deducting the value of old iron taken up,
 140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,
 141. For amount paid other companies, as rent for use of their roads, specifying each company,
 142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,
 143. Total miscellaneous,
 144. Total expenditures for working the road,
 145. Total amount of interest paid during the year,

\$582 05

102 65

* See note on preceding page.

INCOME DURING THE YEAR.*		
146. <i>For Passengers</i> :—		
1. On main road, including branches owned by company,	-	-
2. To and from other roads, specifying what,	-	-
147. <i>For Freight</i> :—		
1. On main road and branches owned by Co.,	-	-
2. To and from other connecting roads,	-	-
148. U. S. mails,	-	-
149. Rents,	\$8,591 05	
150. Total income,		\$8,591 05
151. Net earnings, after deducting expenses,	7,956 85	
DIVIDENDS.		
152. 3 per cent. Total,	\$8,019 00	
153. Surplus not divided,	634 41	
154. Surplus last year,	Nothing.	
155. Total surplus, cash and loans, ; stocks and bonds, ; real estate, fuel, ;		\$634 41
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—		
156. Of road and bridges,	-	-
157. Buildings,	-	-
158. Engines and cars,	-	-
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage of road and franchise, or any property of the Corpora- tion, per last report,	None.	
160. Mortgage debt paid since last report,	Nothing.	
161. Increase of mortgage debts since last report,	Nothing.	
162. Present amount of mortgage debts,	None.	
163. Number of mortgages, on road and franchise or any property of the Corporation,	None.	

ACCIDENTS.

January 3, 1870.—George Heyward, an employé, was caught between the cars at Groton, and severely injured.

August 19, 1870.—Michael McOskee, an employé, was struck by a locomotive near Groton Junction, and severely injured.

F. B. CROWNINSHIELD,
DANIEL S. RICHARDSON,
EDWARD SPALDING,
HENRY SIGOURNEY,

Directors of the Nashua and Lowell Railroad Corporation.

STATE OF NEW HAMPSHIRE.

HILLSBOROUGH, ss. November 17, 1870. Then personally appeared Edward Spalding, and made oath to the truth of the foregoing statement by him subscribed.

Before

A. McKEAN, *Justice of the Peace.*

SUFFOLK, ss. November 18, 1870. Then personally appeared F. B. Crow
shield, Daniel S. Richardson and Henry Sigourney, and severally made oath to
truth of the foregoing statement by them subscribed.

Before

C. E. A. BARTLETT, *Justice of the Peace*

REPORT

OF THE

STOUGHTON BRANCH RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$150,0
2. Number of shares of capital stock issued,	854	
3. Increase of capital since last report,	None.	
4. Capital paid in, per last report,	\$85,400 00	
5. Capital paid in since last report,	None.	
6. Total amount of capital stock paid in,		85,400 00
7. Amount realized in cash value for stock issued,	85,400 00	
8. Funded debt, per last report,	None.	
9. Funded debt paid since last report,	None.	
10. Funded debt, increase of, since last report,	None.	
11. Total present amount of funded debt,	None.	
12. Floating debt, per last report,	None.	
13. Floating debt paid since last report,	None.	
14. Floating debt, increase of, since last report,	8,500 00	
15. Total present amount of floating debt,		8,500 00
16. Total present amount of funded and floating debt,		8,500 00
17. Whole amount in cash value realized from funded and floating debts,	8,500 00	
18. Whole amount in cash value realized from stock and debts,	-	-
19. Average rate of interest per annum paid during the year,	7 per cent.	
20. Maximum amount of debts during the year,	8,500 00	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$38,401 98	
22. For graduation and masonry paid during the past year,	None.	
23. Total amount expended for graduation and masonry,		\$38,401 98
24. For wooden bridges, per last report,	1,770 06	
25. For wooden bridges paid during the past year,	None.	
26. Total amount expended for wooden bridges,		1,770 06
27. Total amount expended for iron bridges, (if any,)	No iron bridges.	
28. For superstructure, including iron, per last report,	36,822 87	
29. For superstructure, including iron, paid during the past year,	None.	
30. Total amount expended for superstructure, including iron,		36,822 87
31. For stations, buildings and fixtures, per last report,	16,413 09	
32. For stations, buildings and fixtures paid during the past year,	None.	

33. Total amount expended for stations, buildings and fixtures,		\$16,413
34. For land, land-damages and fences, per last report,	\$8,945 51	
35. For land, land-damages and fences paid during the past year,	None.	
36. Total amount expended for land, land-damages, and fences,		8,945
37. For locomotives, per last report,	None.	
38. For locomotives paid during the past year,	8,500 00	
39. Total amount expended for locomotives,		8,500
40. For passenger and baggage cars, per last report,	8,700 00	
41. For passenger and baggage cars paid during the past year,	None.	
42. Total amount expended for passenger and baggage cars,		8,700
43. For merchandise cars, per last report,	} No merchandise cars.	
44. For merchandise cars paid during the past year,		
45. Total amount expended for merchandise cars,		
46. For engineering, per last report,	2,887 50	
47. For engineering paid during the past year,	None.	
48. Total amount expended for engineering,		2,887
49. For agencies and other expenses, per last report,	Nothing.	
50. For agencies and other expenses, paid during the past year,	Nothing.	
51. Total amount expended for agencies and other expenses,	Nothing.	
52. Amounts of discounts or other sacrifices on stock and bonds issued,	Nothing.	
53. Total cost of road and equipment,		121,941
54. Amount of assets or property held by the corporation in addition to the cost of the road; cash and loans, ; stocks and bonds, ; real estate, ; fuel,	Nothing.	
55. Income expended in construction and equipment,	Nothing.	
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	4 miles, 232 feet.	
57. Length of main road in other States, (specifying how much in each,)	All in Massachusetts.	
58. Length of single main track,	4 miles, 232 feet.	
59. Length of double main track,	None.	
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	None.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	4,249 feet.	
62. Length of roads belonging to other companies operated by this Company,	None.	
63. Total miles of road operated by this Company,	4 miles, 232 feet.	
64. Weight of rail, per yard, in main road,	56 lbs.	
65. Weight of rail, per yard, in branch roads (specify the different weights per yard,)	No branches.	
66. Maximum grade, with its length, in main road,	46 ft. per mile for 470 ft.	
67. Maximum grade, with its length, in branch roads,	No branches.	
68. Total rise and fall in main road,	135 50-100 feet.	
69. Total rise and fall in branch roads,	No branches.	
70. Shortest radius of curvature, with length of curve, in main road,	} 1,080 feet radius; length of curvature, 682 feet.	
71. Shortest radius of curvature, with length of curve, in branch roads,		
72. Total degrees of curvature in main road,	No branches.	
	172°	

73. Total degrees of curvature in branch roads, . . .	No branches.
74. Total length of straight line in main road, . . .	2 miles, 207 feet.
75. Total length of straight line in branches, . . .	No branches.
76. Aggregate length of wooden truss bridges, . . .	50 feet 6 inches.
77. Aggregate length of all other wooden bridges, . . .	No other.
78. Aggregate length of iron bridges, . . .	No iron bridges.
79. Whole length of road unfenced on both sides, . . .	None except crossings.
80. Number of public ways crossed at grade, . . .	6
81. Number of railroads crossed at grade, . . .	None.
82. Remarks, . . .	—
83. Way stations for express trains, . . .	No express trains.
84. Way stations for accommodation trains, . . .	3
85. Flag stations, . . .	None.
86. Whole number of way stations, . . .	3
87. Whole number of flag stations, . . .	None.
DOINGS DURING THE YEAR.*	
88. Miles run by passenger trains, . . .	8,704
89. Miles run by freight trains, [passenger and freight connected,] . . .	—
90. Miles run by other trains, . . .	4,176
91. Total miles run, . . .	12,880
92. Number of passengers carried in the cars, . . .	101,665
93. Number of passengers carried one mile, . . .	271,248
94. Number of tons of merchandise carried in the cars, . . .	32,068.5
95. Number of tons of merchandise carried one mile, . . .	64,428.84
96. Number of passengers carried one mile, to and from other roads, . . .	90,924
97. Number of tons carried one mile, to and from other roads, . . .	36,039.29
98. Rate of speed adopted for express passenger trains, including stops, . . .	No express trains.
99. Average rate of speed actually attained by express passenger trains, including stops and detentions, . . .	No express trains.
100. Rate of speed adopted for accommodation trains, . . .	18 miles per hour.
101. Rate of speed actually attained by accommodation trains, including stops and detentions, . . .	18 miles per hour.
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	No special trains.
103. Average rate of speed adopted for freight trains, including stops, . . .	} Passenger and freight connected in part.
104. Estimated weight, in tons, of passenger cars, (not including passengers,) hauled one mile, . . .	
105. Estimated weight, in tons, of merchandise cars, (not including freight,) hauled one mile, . . .	} Operated by B. & P. R. R. principally.
EXPENDITURES FOR WORKING THE ROAD.*	
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron, . . .	} Operated by B. & P. R. R. Co., principally by contract.
107. For repairs of wooden bridges, . . .	
108. For wages of switchmen, average per month, . . . \$	
109. For wages of gate-keepers, average per month, . . .	
110. For wages of signal-men, average per month, . . .	
111. For wages of watchmen, average per month, . . .	

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

112. Number of men employed, exclusive of those engaged in construction,
 113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)
 114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,
 115. Total for maintenance of way,

Operated by B. & P. R. Co., principally by tract.

MOTIVE POWER AND CARS.

116. For repairs of locomotives, \$87 02
 117. For new locomotives, to cover depreciation, None.
 118. For repairs of passenger cars, 872 15
 119. For new passenger cars, to cover depreciation, None.
 120. For repairs of merchandise cars, None.
 121. For new merchandise cars, to cover depreciation, None.
 122. For repairs of gravel and other cars, None.
 123. Total for maintenance of motive power and cars, \$959
 124. Number of engines, One.
 125. Number of passenger cars, Two.
 126. Number of baggage cars, None.
 127. Number of merchandise cars, None.
 128. Number of gravel cars, None.

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz.:—
 1. Wood, No. of cords, 53. Cost of the same, \$265 00
 2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 78 1,820-2,240. Cost of same, 708 00
 130. For oil used by cars and engines, 182 53
 131. For waste and other material for cleaning, 43 80
 132. For salaries, wages and incidental expenses, chargeable to passenger department, 2,209 38
 133. For salaries, wages and incidental expenses, chargeable to freight department, —
 134. For gratuities and damages, —
 135. For taxes and insurance, 675 88
 136. For ferries, —
 137. For repairs of station buildings, aqueducts, fixtures, furniture, 519 43
 138. For renewals of iron, including laying down, 2,681 81
 139. For new iron laid down, deducting the value of old iron taken up, —
 140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company, [B. & P. R. R. Co.,] 3,615 80
 141. For amount paid other companies, as rent for use of their roads, specifying each company, —
 142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items, 675 52
 143. Total miscellaneous, —
 144. Total expenditures for working the road, \$11,477 297
 145. Total amount of interest paid during the year,

INCOME DURING THE YEAR.*

146. For Passengers:—
 1. On main road, including branches owned by company, \$1,239 05
 2. To and from other roads specifying what, [B. & P. R. R. Co.,] 8,671 03

\$12,738

* See note on preceding page.

REPORT

OF THE

. TAUNTON BRANCH R. R. CORPORATION

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$450,000
2. Number of shares of capital stock issued,	4,000	
3. Increase of capital since last report,	-	-
4. Capital paid in, per last report,	\$250,700 00	
5. Capital paid in since last report,	149,300 00	
6. Total amount of capital stock paid in,		400,000
7. Amount realized in cash value for stock issued,	400,000 00	
8. Funded debt, per last report,		
9. Funded debt paid since last report,	None.	
10. Funded debt, increase of, since last report,		
11. Total present amount of funded debt,		
12. Floating debt, per last report,	21,180 65	
13. Floating debt paid since last report,	-	-
14. Floating debt, increase of, since last report,	2,376 20	
15. Total present amount of floating debt,		23,556 85
16. Total present amount of funded and floating debt,		23,556 85
17. Whole amount in cash value realized from funded and floating debts,	23,556 85	
18. Whole amount in cash value realized from stock and debts,	423,556 85	
19. Average rate of interest per annum paid during the year,	Seven per cent.	
20. Maximum amount of debts during the year,	62,089 43	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$89,855 38	
22. For graduation and masonry paid during the past year,	78,402 60	
23. Total am't expended for graduation and masonry,		\$160,257 98
24. For wooden bridges, per last report,	-	-
25. For wooden bridges paid during the past year,	2,170 56	
26. Total amount expended for wooden bridges,		2,170 56
27. Total amount expended for iron bridges, (if any,)	-	-
28. For superstructure, including iron, per last report,	92,248 56	
29. For superstructure, including iron, paid during the past year,	66,771 87	
30. Total amount expended for superstructure, including iron,		159,020 43
31. For stations, buildings and fixtures, per last report,	81,639 59	
32. For stations, buildings and fixtures paid during the past year,	-	-

33. Total amount expended for stations, buildings and fixtures,		\$31,639 59
34. For land, land-damages and fences, per last report,	\$30,769 61	
35. For land, land-damages and fences paid during the past year,	3,479 44	
36. Total amount expended for land, land-damages, and fences,		\$4,249 05
37. For locomotives, per last report,	16,383 67	
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,		16,383 67
40. For passenger and baggage cars, per last report,	9,421 66	
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,		9,421 66
43. For merchandise cars, per last report,	13,922 15	
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,		13,922 15
46. For engineering, per last report,	13,539 27	
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		13,539 27
49. For agencies and other expenses, per last report,	2 75	
50. For agencies and other expenses paid during the past year,	144 46	
51. Total amount expended for agencies and other expenses,		147 21
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,		490,751 47
[Amount charged off for depreciation,]	97,779 89	
		392,971 58
54. Amount of assets or property held by the corporation in addition to the cost of the road; [accounts,] cash and loans, [&c.,] \$52,284.85; stocks and bonds, \$16,000; real estate, \$2,837.78; fuel, \$1,193.74; [Weir Branch, \$5,162.60,]	76,428 97	
55. Income expended in construction and equipment,	97,779 89	
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	11 1-10 miles.	
57. Length of main road in other States, (specifying how much in each,)	None.	
58. Length of single main track,	11 1-10 miles.	
59. Length of double main track,	None.	
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	3,000 feet single track in this State.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	6,700 feet.	
62. Length of roads belonging to other companies operated by this Company,	None.	
63. Total miles of road operated by this Company,	11 1-10 miles.	
64. Weight of rail, per yard, in main road,	58 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	57 lbs.	
66. Maximum grade, with its length, in main road,	29 feet in 3,000.	
67. Maximum grade, with its length in branch roads,	35 ft. per mile, 400 ft.	
68. Total rise and fall in main road,	123 feet.	
69. Total rise and fall in branch roads,	9 feet.	
70. Shortest radius of curvature, with length of curve, in main road,	800 ft. in 1,000 ft.	

71. Shortest radius of curvature, with length of curve, in branch roads,	250 ft. in 300 ft.
72. Total degrees of curvature in main road,	70°
73. Total degrees of curvature in branch roads,	87° 45'
74. Total length of straight line in main road,	11 miles.
75. Total length of straight line in branches,	2,200 feet.
76. Aggregate length of wooden truss bridges,	} No bridges.
77. Aggregate length of all other wooden bridges,	
78. Aggregate length of iron bridges,	
79. Whole length of road unfenced on both sides,	900 feet.
80. Number of public ways crossed at grade,	19
81. Number of railroads crossed at grade,	} None.
82. Remarks,	
83. Way stations for express trains,	
84. Way stations for accommodation trains,	1
85. Flag stations,	3
86. Whole number of way stations,	1
87. Whole number of flag stations,	3
DOINGS DURING THE YEAR.*	
88. Miles run by passenger trains,	49,940
89. Miles run by freight trains,	15,246
90. Miles run by other trains,	160
91. Total miles run,	6
92. Number of passengers carried in the cars,	183,783
93. Number of passengers carried one mile,	1,933,922
94. Number of tons of merchandise carried in the cars,	77,987 616-2,0
95. Number of tons of merchandise carried one mile,	849,113 824-2,0
96. Number of passengers carried one mile, to and from other roads,	1,773,081
97. Number of tons carried one mile, to and from other roads,	830,676 916-2,0
98. Rate of speed adopted for express passenger trains, including stops,	} No express trains.
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	
100. Rate of speed adopted for accommodation trains,	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	25 miles per hour.
102. Average rate of speed actually attained by special trains, including stops and detentions,	25 miles per hour.
103. Average rate of speed adopted for freight trains, including stops,	None.
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile,	15 miles per hour.
105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile,	1,441,440
	4,102,000
EXPENDITURES FOR WORKING THE ROAD.*	
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$10,425 91
107. For repairs of wooden bridges,	-
108. For wages of switchmen, average per month, \$45 00	} Total,
109. For wages of gate-keepers, average per month, 15 00	
110. For wages of signal-men, average per month, 10 00	
111. For wages of watchmen, average per month, 50 00	
	688 50
	-
	489 00
	1,272 81

* All items under the headings marked with an asterisk, are required by law for "the total road operated by this company."

112. Number of men employed, exclusive of those engaged in construction,	-	-
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used.)	\$319	12
114. For repairs of fences, gates, houses for signalmen, gate-keepers, switchmen, tool-houses,	342	46
115. Total for maintenance of way,	\$13,637	80

MOTIVE POWER AND CARS.

116. For repairs of locomotives,	\$2,908	07
117. For new locomotives, to cover depreciation,	-	-
118. For repairs of passenger cars,	2,512	18
119. For new passenger cars, to cover depreciation,	3,275	62
120. For repairs of merchandise cars,	1,731	66
121. For new merchandise cars, to cover depreciation,	849	92
122. For repairs of gravel and other cars,	-	-
123. Total for maintenance of motive power and cars,	\$11,277	40
124. Number of engines,	5	
125. Number of passenger cars,	8	
126. Number of baggage cars,	5	
127. Number of merchandise cars,	104	
128. Number of gravel cars,	2	

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz.:—	}	\$12,327	83
1. Wood, number of cords, Cost of the same,			
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) Cost of same,			
130. For oil used by cars and engines,		1,120	05
131. For waste and other material for cleaning,		-	-
132. For salaries, wages, and incidental expenses, chargeable to passenger department,		12,073	50
133. For salaries, wages, and incidental expenses, chargeable to freight department,		13,496	24
134. For gratuities and damages,		494	45
135. For taxes and insurance,		3,553	57
136. For ferries,		-	-
137. For repairs of station buildings, aqueducts, fixtures, furniture,		3,844	38
138. For renewals of iron, including laying down,		-	-
139. For new iron laid down, deducting the value of old iron taken up,		-	-
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,		-	-
141. For amount paid other companies, as rent for use of their roads, specifying each company,		-	-
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,		6,796	38
143. Total miscellaneous,		\$58,706	40
144. Total expenditures for working the road,		78,521	60
145. Total amount of interest paid during the year,		715	90

* See note on preceding page.

INCOME DURING THE YEAR.*		
146. <i>For Passengers</i> :—		
1. On main road including branches owned by company,	\$5,414 81	\$61,200
2. To and from other roads, specifying what,	55,798 30	
147. <i>For Freight</i> :		
1. On main road and branches owned by company,	1,222 22	39,390
2. To and from other connecting roads,	38,168 74	
148. U. S. mails,	1,125 00	
149. Rents,	449 00	
150. Total income,		102,170
151. Net earnings, after deducting expenses, [and interest,]	22,935 57	
DIVIDENDS.		
152. 4 per cent. Total,		\$10,500
153. Surplus not divided,	\$12,426 76	45,840
154. Surplus last year,	33,414 19	
155. Total surplus; [accounts,] cash and loans, \$52,234.85; stocks and bonds, \$15,000; real estate, \$2,887.78; fuel, \$1,193.74; [Weir Br., \$5,162.60,]		76,420
[Less debts, amount due to construction account, &c.,]	30,588 02	45,840
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—		
156. Of road and bridges,	None.	
157. Buildings,		
158. Engines and cars,		
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last Report,	None.	
160. Mortgage debt paid since last report,		
161. Increase of mortgage debt since last report,		
162. Present amount of mortgage debts,		
163. Number of mortgages, on road and franchise or any property of the Corporation,		

WILLARD LOVERING,
N. H. EMMONS,
T. B. WALES,
JAMES M. BEEBE,
WM. MASON,

Directors of the Taunton Branch Railroad Company

SUFFOLK, ss. October 28 and 29, 1870. Then personally appeared Willard Lovering, William Mason, James M. Beebe, N. H. Emmons and T. B. Wales, and each of them severally made oath to the truth of the foregoing statement by them subscribed.

Before

E. PICKERING, *Justice of the Peace*

REPORT

OF THE

VERMONT AND MASSACHUSETTS R. R. CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	\$3,200,000 00
2. Number of shares of capital stock issued,	28,600
3. Increase of capital since last report,	Nothing.
4. Capital paid in, per last report,	\$2,860,000 00
5. Capital paid in since last report,	Nothing.
6. Total amount of capital stock paid in,	2,860,000 00
7. Amount realized in cash value for stock issued,	2,860,000 00
8. Funded debt, per last report,	724,500 00
9. Funded debt paid since last report,	Nothing.
10. Funded debt, increase of, since last report,	25,500 00
11. Total present amount of funded debt,	750,000 00
12. Floating debt, per last report,	111,646 30
13. Floating debt paid since last report,	Nothing.
14. Floating debt, increase of, since last report,	87,980 36
15. Total present amount of floating debt,	199,626 66
16. Total present amount of funded and floating debt,	949,626 66
17. Whole amount in cash value realized from funded and floating debts,	949,626 66
18. Whole amount in cash value realized from stock and debts,	3,809,626 66
19. Average rate of interest per annum paid during the year,	6 433-1,000 per cent.
20. Maximum amount of debts during the year,	949,626 66

COST OF ROAD AND EQUIPMENT.

21. For graduation and masonry, per last report,	\$1,461,323 12
22. For graduation and masonry paid during the past year,	Nothing.
23. Total amt't expended for graduation and masonry,	\$1,461,323 12
24. For wooden bridges, per last report,	199,395 31
25. For wooden bridges, paid during th past year,	Nothing.
26. Total amount expended for wooden bridges,	199,395 31
27. Total amount expended for iron bridges (if any,)	Nothing
28. For superstructure, including iron, per last report,	600,422 01
29. For superstructure, including iron, paid during the past year,	Nothing.
30. Total amount expended for superstructure, including iron,	600,422 01
31. For stations, buildings and fixtures, per last report,	129,274 36
32. For stations, buildings and fixtures paid during the past year,	Nothing.

33. Total amount expended for stations, buildings and fixtures,		\$129,27
34. For land, land-damages and fences, per last report,	\$177,301 76	
35. For land, land-damages and fences, paid during the past year,	Nothing.	
36. Total amount expended for land, land-damages and fences,		177,30
37. For locomotives, per last report,	95,638 62	
38. For locomotives, paid during the past year,	Nothing.	
39. Total amount expended for locomotives,		95,63
40. For passenger and baggage cars, per last report,	20,190 00	
41. For passenger and baggage cars, paid during the past year,	Nothing.	
42. Total amount expended for passenger and baggage cars,		20,19
43. For merchandise cars, per last report,	91,514 89	
44. For merchandise cars, paid during the past year,	Nothing.	
45. Total amount expended for merchandise cars,		91,61
46. For engineering, per last report,	56,872 04	
47. For engineering, paid during the past year,	Nothing.	
48. Total amount expended for engineering,		56,87
49. For agencies and other expenses, per last report,	385,441 83	
50. For agencies and other expenses, paid during the past year,	Nothing.	
51. Total amount expended for agencies and other expenses,		385,44
52. Amounts of discounts or other sacrifices on stock and bonds issued,	Nothing.	
[Charged to Greenfield Branch in addition to the above,]		
53. Total cost of road and equipment,	248,670 08	*\$3,465,9
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, \$17,986.77; stocks and bonds, \$36,500; [Sinking Fund, \$36,000;] real estate, \$69,679.16; fuel, \$17,919.25; [sundry accounts, \$78,367.42,]	255,452 60	-
55. Income expended in construction and equipment,	-	-
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	59 miles.	
57. Length of main road in other States, (specifying how much in each,) [Vermont,]	10 miles 1,660 feet.	
58. Length of single main track,	69 miles 1,660 feet.	
59. Length of double main track,	None.	
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	10 4-5 miles, single track in this State.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	About 9 miles.	
62. Length of roads belonging to other companies operated by this Company,	About 30 miles.	
63. Total miles of road operated by this Company,	About 109 4-5 miles.	
64. Weight of rail, per yard, in main road,	56 lbs. and 60 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	56 lbs.	
66. Maximum grade, with its length, in main road,	58 ft. for 1 6-10 mile	
67. Maximum grade, with its length, in branch roads,	45 ft. for 3 1/2 miles.	
68. Total rise and fall in main road,	808 ft. rise, 990 ft. fall	

* Amount expended on Turner's Falls Branch, September 30, 1870, \$187,126.72.

69. Total rise and fall in branch roads,	116 feet rise, 168 feet fall.
70. Shortest radius of curvature, with length of curve, in main road,	{ 1,000 feet for 1,900 feet, except at Grout's, where it is 924 feet for 1,200 feet.
71. Shortest radius of curvature, with length of curve, in branch roads,	1,000 feet for 400 feet.
72. Total degrees of curvature in main road,	3,314°
73. Total degrees of curvature in branch roads,	759°
74. Total length of straight line in main road,	27½ miles.
75. Total length of straight line in branches,	5 7-10 miles.
76. Aggregate length of wooden truss bridges,	7,610 feet.
77. Aggregate length of all other wooden bridges,	800 feet.
78. Aggregate length of iron bridges,	None.
79. Whole length of road unfenced on both sides,	None.
80. Number of public ways crossed at grade, [72 in Vt. and Mass., 2 Turner's Falls Branch, 22 T. & G. R. R.,]	96
81. Number of railroads crossed at grade,	One.
82. Remarks,	—
83. Way stations for express trains,	No express trains.
84. Way stations for accommodation trains,	20
85. Flag stations,	8
86. Whole number of way stations,	20
87. Whole number of flag stations,	8

DOINGS DURING THE YEAR.*

[Including the portion of the Troy & Greenfield Railroad operated under lease from the Commonwealth.]

88. Miles run by passenger trains,	129,239	
89. Miles run by freight trains,	74,122	
90. Miles run by other trains,	21,806	
91. Total miles run,		225,166
92. Number of passengers carried in the cars,	267,315	
93. Number of passengers carried one mile,	4,271,685	
94. Number of tons of merchandise carried in the cars,	190,229	709-2,000
95. Number of tons of merchandise carried one mile,	3,853,273	916-2,000
96. Number of passengers carried one mile, to and from other roads,	2,219,074	
97. Number of tons carried one mile, to and from other roads,	2,862,906	73-2,000
98. Rate of speed adopted for express passenger trains, including stops,	No express train.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	No express train.	
100. Rate of speed adopted for accommodation trains,	20 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	25 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	25 miles per hour.	
103. Average rate of speed adopted for freight trains, including stops,	8 miles per hour.	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile,	5,353,755	
105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile,	6,655,244	

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$77,303 17
107. For repairs of wooden bridges,	33,748 89

* All items under the headings marked with an asterisk are required by law for "the total miles of road operated by this company."

108. For wages of switchmen, average per month,	\$58 00	Total,	\$9,062 05
109. For wages of gate-keepers, average per month,	20 00		
110. For wages of signal-men, average per month,	27 00		
111. For wages of watchmen, average per month,	50 00		
112. Number of men employed, exclusive of those engaged in construction,	456		
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	\$1,509 00		
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,	2,468 33		
115. Total for maintenance of way,			\$124,091
MOTIVE POWER AND CARS.			
116. For repairs of locomotives,	\$25,143 42	}	\$63,193 42
117. For new locomotives, to cover depreciation,	38,050 00		
118. For repairs of passenger cars,	12,962 68		
119. For new passenger cars, to cover depreciation,	7,826 00		
120. For repairs of merchandise cars,	11,366 62	}	18,116 62
121. For new merchandise cars, to cover depreciation,	6,750 00		
122. For repairs of gravel and other cars,	552 89		
123. Total for maintenance of motive power and cars,			\$102,650
124. Number of engines,	15		
125. Number of passenger cars,	17		
126. Number of baggage cars,	10		
127. Number of merchandise cars,	228		
128. Number of gravel cars,	None.		
MISCELLANEOUS.*			
129. For fuel used by engines during the year, viz.:—			
1. Wood, No. of cords, 7,379. Cost of the same,	\$40,490 77		
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) [None.] Cost of same,	—		—
[Repairs of tools,]	4,009 53		
130. For oil used by cars and engines,	4,482 34		
131. For waste and other material for cleaning,	1,709 18		
132. For salaries, wages and incidental expenses, chargeable to passenger department,	42,021 73		
133. For salaries, wages and incidental expenses, chargeable to freight department,	41,438 65		
134. For gratuities and damages,	15,877 45		
135. For taxes and insurance,	5,089 39		
136. For ferries,	None.		
137. For repairs of station buildings, aqueducts, fixtures, furniture,	4,624 21		
138. For renewals of iron, including laying down,	40,905 96	}	
139. For new iron laid down, deducting the value of old iron taken up,			
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company, [Connecticut River Railroad Co.,]	1,250 00		
141. For amount paid other companies, as rent for use of their roads, specifying each company, [Commonwealth of Mass., for one-half rent of the Troy and Greenfield Railroad,]	7,500 00		

* See note on preceding page.

142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items, [salaries, \$7,525; miscellaneous, \$9,449.46; advertising and stationery, \$871.87; law expenses, \$1,328.36,]	\$19,174 69
143. Total miscellaneous,	\$4,221 17
[United States tax,]	
	\$232,795 07
144. Total expenditures for working the road,	459,537 12
145. Total amount of interest paid during the year,	45,645 84
INCOME DURING THE YEAR.*	
146. For <i>Passengers</i> :—	
1. On main road, including branches owned by company,	\$71,888 67
2. To and from other roads, specifying what,†	88,162 16
147. For <i>Freight</i> :—	
1. On main road and branches owned by Co.,	69,661 95
2. To and from other connecting roads,	159,158 79
148. U. S. mails, [\$6,791; tolls, \$4,030.20,]	10,821 20
149. Rents, [\$48,353.55; express, \$8,300; miscellaneous, \$315,]	56,968 55
150. Total income,	\$456,651 32
151. Net earnings, after deducting expenses,	—
DIVIDENDS.	
152. per cent. Total,	Nothing.
153. Surplus not divided,	Nothing.
154. Surplus last year,	Nothing.
155. Total surplus; [no surplus carried to dividends,] cash and loans,; stocks and bonds,; real estate,; fuel,	Nothing.
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—	
156. Of road and bridges,	Nothing.
157. Buildings,	Nothing.
158. Engines and cars,	Nothing.
MORTGAGE DEBTS.	
159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last report,	\$550,000 00
160. Mortgage debt paid since last report,	Nothing.
161. Increase of mortgage debt since last report,	Nothing.
162. Present amount of mortgage debts,	550,000 00
163. Number of mortgages on road and franchise, or any property of the Corporation,	One.

DANIEL S. RICHARDSON,
WM. H. HILL,
GEORGE F. FAY,
JAS. A. DUPEE,

Directors of the Vermont and Massachusetts Railroad Corporation.

† Fitchburg, New London Northern, Rutland and Burlington, Troy and Boston, Stony Brook, Rensselaer and Saratoga, Boston, Clinton and Fitchburg, Grand Trunk, Ashuelot, Connecticut and Passumpsic River, Vermont Central, Boston and Albany, and Connecticut River Railroads.

Suffolk, ss. November 9, 1870. Then personally appeared Daniel S. Ri
son, William H Hill, George F. Fay and James A. Dupee, and severally made
to the truth of the foregoing statement by them subscribed

Before

P. R. TESCHEMACHER, *Justice of the Peace*

REPORT

OF THE

WARE RIVER RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$1,000,000 00
2. Number of shares of capital stock issued,	2,400	
3. Increase of capital since last report,	None.	
4. Capital paid in, per last report,	\$90,890 00	
5. Capital paid in since last report,	149,110 00	
6. Total amount of capital stock paid in,		240,000 00
7. Amount realized in cash value for stock issued,	-	-
8. Funded debt, per last report,	-	-
9. Funded debt paid since last report,	-	-
10. Funded debt, increase of, since last report,	239,300 00	
11. Total present amount of funded debt,		239,300 00
12. Floating debt, per last report,	-	-
13. Floating debt paid since last report,	-	-
14. Floating debt, increase of, since last report,	-	-
15. Total present amount of floating debt,	-	-
16. Total present amount of funded and floating debt,	-	-
17. Whole amount in cash value realized from funded and floating debts,	239,300 00	
18. Whole amount in cash value realized from stock and debts,	-	-
19. Average rate of interest per annum, paid during the year,	None.	
20. Maximum amount of debts during the year,	-	-

COST OF ROAD AND EQUIPMENT.

[The road is in process of construction, but not yet entirely graded.]

MORTGAGE DEBTS.

159. Amount of debts secured by mortgage, of road and franchise or any property of the Corporation, per last report,	-	-
160. Mortgage debt paid since last report,	-	-
161. Increase of mortgage debt since last report,	-	-
162. Present amount of mortgage debts,	\$239,300 00	
163. Number of mortgages, on road and franchise or any property of the Corporation,	One.	

[NOTE.—The road is in process of construction, and not yet completed or in running order.

The first section of which is leased to the New London N. R. R. Co.
They have not yet taken it under the lease.]

CHAS. A. STEVENS,
WILLIAM HYDE,
ADDISON SANDFORD,
S. B. BOND,
LEWIS N. GILBERT,

Majority of the Directors of the Ware River Railroad Corporation

HAMPDEN, ss. October 29, 1870. Then personally appeared C. A. Stevens, W. Hyde, A. Sandford, S. B. Bond and Lewis N. Gilbert, and severally made oath the truth of the foregoing statement by them subscribed.

Before me,

OTIS LANE, *Justice of the Peace*

R E P O R T

OF THE

WEST STOCKBRIDGE RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$75,000 00
2. Number of shares of capital stock issued,	396	
3. Increase of capital since last report,	-	-
4. Capital paid in, per last report,	\$39,600 00	
5. Capital paid in since last report,	-	-
6. Total amount of capital stock paid in,		39,600 00
7. Amount realized in cash value for stock issued,	39,600 00	
8. Funded debt, per last report,	} The Corporation has no debt.	
9. Funded debt paid since last report,		
10. Funded debt, increase of, since last report,		
11. Total present amount of funded debt,		
12. Floating debt, per last report,		
13. Floating debt paid since last report,		
14. Floating debt, increase of, since last report,		
15. Total present amount of floating debt,		
16. Total present amount of funded and floating debt,		
17. Whole amount in cash value realized from funded and floating debts,		
18. Whole amount in cash value realized from stock and debts,		
19. Average rate of interest per annum paid during the year,	-	-
20. Maximum amount of debts during the year,	-	-
COST OF ROAD AND EQUIPMENT.		
53. Total cost of road and equipment,		\$39,600 00
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, ; stocks and bonds, ; real estate, ; fuel,	-	-
55. Income expended in construction and equipment,	-	-
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	2½ miles.	
57. Length of main road in other States, (specifying how much in each,)	-	-
58. Length of single main track,	-	-
59. Length of double main track,	-	-
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	-	-

61. Aggregate length of sidings, and other tracks, excepting main track and branches,	-	-
62 Length of roads belonging to other companies operated by this Company,	-	-
63. Total miles of road operated by this Company,	-	-
64. Weight of rail, per yard, in main road,	56 lbs.	-
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	-	-
66. Maximum grade, with its length, in main road,	-	-
67. Maximum grade, with its length, in branch roads,	-	-
68. Total rise and fall in main road,	-	-
69. Total rise and fall in branch roads,	-	-
70. Shortest radius of curvature, with length of curve, in main road,	-	-
71. Shortest radius of curvature, with length of curve, in branch roads,	-	-
72. Total degrees of curvature in main road,	-	-
73. Total degrees of curvature in branch roads,	-	-
74. Total length of straight line in main road,	-	-
75. Total length of straight line in branches,	-	-
76. Aggregate length of wooden truss bridges,	-	-
77. Aggregate length of all other wooden bridges,	-	-
78. Aggregate length of iron bridges,	-	-
79. Whole length of road unfenced on both sides,	-	-
80. Number of public ways crossed at grade,	4	-
81. Number of railroads crossed at grade,	-	-
82. Remarks,	-	-
83. Way stations for express trains,	-	-
84. Way stations for accommodation trains,	-	-
85. Flag stations,	-	-
86. Whole number of way stations,	-	-
87. Whole number of flag stations,	-	-

DOINGS DURING THE YEAR.*

[The road is not run by this corporation, but by the Boston and Albany and Housatonic R. R. Cos., who keep the road, &c., in repair, under a perpetual lease.

The West Stockbridge R. R. Corporation has not and never had any motive power, and never run their road.†]

†Doings of Housatonic Railroad Co. upon W. Stockbridge Railroad, for ten months, ending Sept. 30, 1876.

Miles run by passenger trains,	
Miles run by freight trains,	
Miles run by other trains,	
Total miles run,	
Number of passengers carried in the cars,	
Number of passengers carried one mile,	
Number of tons of merchandise carried in the cars,	
Number of tons of merchandise carried one mile,	
Number of passengers carried one mile to and from other roads,	
Number of tons carried one mile to and from other roads,	
Rate of speed adopted for express passenger trains, including stops,	No express t
Average rate of speed actually attained by special trains, including stops and detentions,	No express t
Rate of speed adopted for accommodation trains,	25 miles per
Rate of speed actually attained by special trains, including stops, &c.,	20 miles per
Average rate of speed actually attained by special trains, including stops, &c.,	20 miles per
Average rate of speed adopted for freight trains, including stops,	9 miles per

I certify that the foregoing is, according to the best of my knowledge and belief, a true statement of the same being returned to me by the Treasurer of the Housatonic R. R. Co.

HENRY W. TAFT, Treas. and Direc

142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	\$109 80	
INCOME DURING THE YEAR.*		
146. For <i>Passengers</i> :—		
1. On main road, including branches owned by Company,	-	-
2. To and from other roads, specifying what,	-	-
147. For <i>Freight</i> :—		
1. On main road and branches owned by Company,	-	-
2. To and from other connecting roads,	-	-
148. U. S. mails,	-	-
149. Rents,	\$1,777 46	
150. Total income,		\$1,806 46
151. Net earnings, after deducting expenses,	-	-
DIVIDENDS.		
152. $3\frac{1}{4}$ per cent. Total,		\$1,386 00
153. Surplus not divided,	\$309 66	
154. Surplus last year,	340 09	
155. Total surplus; cash and loans, ;		
stocks and bonds, ; real estate,		
; fuel,		649 75
ESTIMATED DEPRECIATION BEYOND THE RENEWALS,		
VIZ.:—		
156. Of road and bridges,	-	-
157. Buildings,	-	-
158. Engines and cars,	-	-
MORTGAGE DEBTS.		
159. Amount of debts, secured by mortgage of road and franchise or any property of the corporation, per last report,	} No debt.	?
160. Mortgage debt, paid since last report,		
161. Increase of mortgage debt, since last report,		
162. Present amount of mortgage debts,		
163. Number of mortgages, on road and franchise or any property of the corporation,		

GEO. H. POWER,

F. B. CONE,

HENRY W. TAFT,

Directors of the West Stockbridge Railroad Corporation.

BERKSHIRE, ss. October 26, 1870. Then personally appeared Geo. H. Power, F. B. Cone and Henry W. Taft, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

N. G. BROWN, *Justice of the Peace.*

REPORT

OF THE

WORCESTER AND NASHUA RAILROAD CORPORATION

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	\$2,100,000	
2. Number of shares of capital stock issued,	15,500	
3. Increase of capital since last report,	Nothing.	
4. Capital paid in, per last report,	\$1,370,400 00	
5. Capital paid in since last report, [on account of new stock,]	130,155 00	
6. Total amount of capital stock paid in,	1,400,555 00	1,400,555
7. Amount realized in cash value for stock issued,	1,400,555 00	
8. Funded debt, per last report,	Nothing.	
9. Funded debt paid since last report,	Nothing.	
10. Funded debt, increase of, since last report,	Nothing.	
11. Total present amount of funded debt,	Nothing.	
12. Floating debt, per last report,	81,132 00	
13. Floating debt paid since last report,	80,914 00	
14. Floating debt, increase of, since last report,	3,583 15	
15. Total present amount of floating debt,		3,801
16. Total present amount of funded and floating debt,		3,801
17. Whole amount in cash value realized from funded and floating debts,	3,801 15	
18. Whole amount in cash value realized from stock and debts,	1,404,356 15	
19. Average rate of interest per annum, paid during the year,	Nothing.	
20. Maximum amount of debts during the year,	81,132 00	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry per last report,	\$498,872 47	
22. For graduation and masonry paid during the past year,	35,403 33	
23. Total amount expended for graduation and masonry,		\$534,275
24. For wooden bridges, per last report,	12,363 53	
25. For wooden bridges paid during the past year,	97 00	
26. Total amount expended for wooden bridges,		12,460
27. Total amount expended for iron bridges, (if any,)	Nothing.	
28. For superstructure, including iron, per last report,	453,478 37	
29. For superstructure, including iron, paid during the past year,	87,046 70	
30. Total amount expended for superstructure, including iron,		540,525
31. For stations, buildings and fixtures, per last report,	136,833 96	
32. For stations, buildings and fixtures, paid during the past year,	4,020 53	

33. Total amount expended for stations, buildings and fixtures,	\$140,854 49
34. For land, land-damages and fences, per last report,	\$209,098 05
35. For land, land-damages and fences, paid during the past year,	9,354 14
36. Total amount expended for land, land-damages, and fences,	218,452 19
37. For locomotives, per last report,	75,739 82
38. For locomotives paid during the past year,	Nothing.
39. Total amount expended for locomotives,	75,739 82
40. For passenger and baggage cars, per last report,	22,837 21
41. For passenger and baggage cars paid during the past year,	Nothing.
42. Total amount expended for passenger and baggage cars,	22,837 21
43. For merchandise cars, per last report,	71,045 81
44. For merchandise cars paid during the past year,	11,400 00
45. Total amount expended for merchandise cars,	82,445 81
46. For engineering, per last report,	40,457 02
47. For engineering paid during the past year,	906 55
48. Total amount expended for engineering,	41,363 57
49. For agencies and other expenses, per last report,	76,368 80
50. For agencies and other expenses, paid during the past year,	Nothing.
51. Total amount expended for agencies and other expenses,	76,368 80.
52. Amounts of discounts or other sacrifices on stock and bonds issued,	60,804 96
53. Total cost of road and equipment,	1,806,128 25
54. Amount of assets or property held by the corporation in addition to the cost of the road; [accounts,] cash and loans, \$58,844.92; stocks and bonds, [None]; real estate, \$15,250; fuel, [and materials for working road, \$77,910.63,].	-
55. Income expended in construction and equipment,	387,500 00
CHARACTERISTICS OF ROAD.	
56. Length of main road in this State,	39 6-100 miles.
57. Length of main road in other States, (specifying how much in each,)	6 68-100 miles.
58. Length of single main track,	41 69-100 miles.
59. Length of double main track,	4 miles.
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	Have no branches.
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	11½ miles.
62. Length of roads belonging to other companies operated by this Company,	None.
63. Total miles of road operated by this Company,	45 69-100 miles.
64. Weight of rail, per yard, in main road,	56 to 58 lbs.
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	None.
66. Maximum grade, with its length, in main road,	44 48-100 ft. per mile for 3 44-100 miles, and 52 8-10 ft. per mile for 800 ft.
67. Maximum grade, with its length, in branch roads,	-
68. Total rise and fall in main road,	1,151 80-100 feet.
69. Total rise and fall in branch roads,	None.
70. Shortest radius of curvature, with length of curve, in main road,	1,146 feet for 86-100 mile.

71. Shortest radius of curvature, with length of curve, in branch roads,	None.
72. Total degrees of curvature in main road,	2,110° 47'
73. Total degrees of curvature in branch roads,	None.
74. Total length of straight line in main road,	31 miles.
75. Total length of straight line in branches,	None.
76. Aggregate length of wooden truss bridges,	559 feet.
77. Aggregate length of all other wooden bridges,	335 feet.
78. Aggregate length of iron bridges,	None.
79. Whole length of road unfenced on both sides,	About 8 miles.
80. Number of public ways crossed at grade,	55
81. Number of railroads crossed at grade,	4
82. Remarks,	None.
83. Way stations for express trains,	None.
84. Way stations for accommodation trains,	18
85. Flag stations,	1
86. Whole number of way stations,	18
87. Whole number of flag stations,	1

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains,	73,989	
89. Miles run by freight trains,	168,633	
90. Miles run by other trains,	18,204	
91. Total miles run,		260
92. Number of passengers carried in the cars,	279,870	
93. Number of passengers carried one mile,	4,701,816	
94. Number of tons of merchandise carried in the cars,	247,749	
95. Number of tons of merchandise carried one mile,	7,193,236	
96. Number of passengers carried one mile to and from other roads,	Not ascertained.	
97. Number of tons carried one mile to and from other roads,	Not ascertained.	
98. Rate of speed adopted for express passenger trains, including stops,	Do not run express trains.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	Do not run express trains.	
100. Rate of speed adopted for accommodation trains,	23 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	35 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	Not ascertained.	
103. Average rate of speed adopted for freight trains, including stops,	10 miles per hour.	
104. Estimated weight, in tons, of passenger cars (not including passengers) hauled one mile,	2,600,224	
105. Estimated weight, in tons, of merchandise cars, (not including freight) hauled one mile,	11,831,107½	

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges and renewals of iron,	\$32,096 90
107. For repairs of wooden bridges,	362 78

* All items under the headings marked with an asterisk, are required by law for "the total mileage read operated by this company."

108. For wages of switchmen, average per month,	\$48 50	Total	\$2,606 20
109. For wages of gate-keepers, average per month,	[Have none.]		
110. For wages of signal-men, average per month,	23 67		
111. For wages of watchmen, average per month,	60 00		
112. Number of men employed, exclusive of those engaged in construction,		About 230.	
113. For removing ice and snow (this item to include all labor, tools, repairs, and extra steam-power used,)		2,129 21	
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,		904 51	
115. Total for maintenance of way,			\$38,099 60

MOTIVE POWER AND CARS.

116. For repairs of locomotives,	\$21,122 13
117. For new locomotives, to cover depreciation,	Nothing.
118. For repairs of passenger cars,	10,167 63
119. For new passenger cars, to cover depreciation,	None.
120. For repairs of merchandise cars,	15,844 77
121. For new merchandise cars, to cover depreciation,	5,750 00
122. For repairs of gravel and other cars,	2,429 11
123. Total for maintenance of motive power and cars,	\$55,313 54
124. Number of engines,	13
125. Number of passenger cars,	11
126. Number of baggage cars,	5
127. Number of merchandise cars,	258 and 12-26 of 39 others.
128. Number of gravel cars,	50

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz. :—	
1. Wood, No. of cords, 2,582. Cost of the same,	\$15,280 49
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 3,857. Cost of same,	31,265 22
130. For oil used by cars and engines,	2,334 64
131. For waste and other material for cleaning,	576 19
132. For salaries, wages and incidental expenses, chargeable to passenger department,	22,342 97
133. For salaries, wages and incidental expenses, chargeable to freight department,	45,035 62
134. For gratuities and damages,	255 50
135. For taxes and insurance,	45,059 03
136. For ferries,	Nothing.
137. For repairs of station buildings, aqueducts, fixtures, furniture,	8,586 00
138. For renewals of iron, including laying down,	16,078 23
139. For new iron laid down, deducting the value of old iron taken up,	14,908 23
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	Nothing.
141. For amount paid other companies as rent for use of their roads, specifying each company,	Nothing.
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	15,458 82

* See note on preceding page.

143. Total miscellaneous,		\$202,272 71
144. Total expenditures for working the road,		295,685 84
145. Total amount of interest paid during the year,	Nothing.	
INCOME DURING THE YEAR.*		
146. For Passengers :—		
1. On main road, including branches owned by company,	\$165,437 13	
2. To and from other roads, specifying what,	—	—
147. For Freight :—		
1. On main road, and branches owned by Co.,	272,278 99	
2. To and from other connecting roads,	—	—
148. U. S. mails,	8,854 16	
149. Rents, [and miscellaneous,]	10,976 41	
150. Total income,		\$452,546 66
151. Net earnings, after deducting expenses,	156,860 84	
DIVIDENDS.		
152. 5 per cent. Total,		\$77,500 00
153. Surplus not divided,	\$79,860 84	
154. Surplus last year,	90,717 96	
155. Total surplus, [accounts,] cash and loans, \$58,844 92; stocks and bonds, [None;] real estate, \$15,250; fuel, [ac., \$77,910.63; on account of construction, \$18,073.25,]		170,078 86
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—		
156. Of road and bridges,	} Not estimated.	
157. Buildings,		
158. Engines and cars,		
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage, of road and franchise or any property of the Corporation, per last report,	None.	
160. Mortgage debt paid since last report,	Nothing.	
161. Increase of mortgage debt since last report,	Nothing.	
162. Present amount of mortgage debts,	Nothing.	
163. Number of mortgages, on road and franchise or any property of the Corporation,	None.	

ACCIDENTS.

December 18, 1869.—Allen S. Brown, an employé, fell from a freight car, while at work in the yard at Nashua; the car ran over one leg, injuring him so severely that he lived but eleven days.

August 6, 1870.—Thomas Ford, while walking on the track (unlawfully) near Worcester, was run over and killed by engine and passenger train.

August 26.—Charles E. Chase, instantly killed at Oakdale station in coupling cars, in consequence of getting caught between them.

September 6.—Henry J. Peirce, an employé, fell under the cars in freight yard at Lincoln Square, and instantly killed.

F. H. KINNICUTT,
S. SALISBURY,
THOS. CHASE,
A. F. LAWRENCE,
C. B. HILL,
J. FISHER,

Directors of the Worcester and Nashua Railroad Corporation

WORCESTER, ss. October 31, 1870. Then personally appeared F. H. Kinnicutt, Stephen Salisbury, Thomas Chase, A. F. Lawrence, C. B. Hill and J. Fisher, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

T. W. HAMMOND, *Justice of the Peace.*

WORCESTER, November 2, 1870. The undersigned, Commissioner of the Worcester and Nashua R. R. Co. for the Commonwealth of Massachusetts, having examined this Report, believes it to be correct, and hereby approves the same.

JOHN D. WASHBURN.

The undersigned, Commissioner for the Commonwealth of Massachusetts on the Worcester and Nashua R. R. Co., on the second day of November, 1870, examined the accounts of said road, to determine what proportion of the receipts and expenditures pertained to that part of the road lying in Massachusetts, and what portion to that part lying in New Hampshire.

The cost of the road and equipment, as appears by this report and

the books of the Company, is	\$1,806,128 25
Of which is apportioned to the State of New Hampshire, . . .	127,478 18
to the Commonwealth of Massachusetts,	1,678,650 00

The total earnings for the ten months ending Sept. 30, 1870, were . . . \$462,546 69

And the total expenditure, 295,685 85

Leaving net earnings, after deducting expenses, \$166,860 84

Of which is apportioned to the State of New Hampshire, . . .	10,980 25
to the Commonwealth of Massachusetts,	145,880 59

JOHN D. WASHBURN, *Commissioner.*

REPORT

OF THE

BERKSHIRE RAILROAD CORPORATION

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$800,000
2. Number of shares of capital stock issued,	6,000	
3. Increase of capital since last report,	-	-
4. Capital paid in, per last report,	\$500,000 00	
5. Capital paid in since last report,	-	-
6. Total amount of capital stock paid in,		500,000
7. Amount realized in cash value for stock issued,	-	-
8. Funded debt, per last report,	-	-
9. Funded debt paid since last report,	-	-
10. Funded debt, increase of, since last report,	-	-
11. Total present amount of funded debt,	-	-
12. Floating debt, per last report,	-	-
13. Floating debt paid since last report,	-	-
14. Floating debt, increase of, since last report,	-	-
15. Total present amount of floating debt,	-	-
16. Total present amount of funded and floating debt,	-	-
17. Whole amount in cash value realized from funded and floating debts,		-
18. Whole amount in cash value realized from stock and debts,	-	-
19. Average rate of interest per annum paid during the year,	-	-
20. Maximum amount of debts during the year,	-	-
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$500,000 00	
22. For graduation and masonry paid during the past year,	-	-
23. Total am't expended for graduation and masonry,	-	-
24. For wooden bridges, per last report,	-	-
25. For wooden bridges paid during the past year,	-	-
26. Total amount expended for wooden bridges,	-	-
27. Total amount expended for iron bridges, (if any,)	-	-
28. For superstructure, including iron, per last report,	-	-
29. For superstructure, including iron, paid during the past year,	-	-
30. Total amount expended for superstructure, including iron,	-	-
31. For stations, buildings and fixtures, per last report,	-	-
32. For stations, buildings and fixtures paid during the past year,	-	-

33. Total amount expended for stations, buildings and fixtures,	-	-
34. For land, land-damages and fences, per last report,	-	-
35. For land, land-damages and fences paid during the past year,	-	-
36. Total amount expended for land, land-damages and fences,	-	-
37. For locomotives, per last report,	-	-
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,	-	-
40. For passenger and baggage cars, per last report,	\$100,000	00
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,	-	-
43. For merchandise cars, per last report,	-	-
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,	-	-
46. For engineering, per last report,	-	-
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,	-	-
49. For agencies and other expenses, per last report,	-	-
50. For agencies and other expenses paid during the past year,	-	-
51. Total amount expended for agencies and other expenses,	-	-
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,	\$800,000	00
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans,; stocks and bonds,; real estate,; fuel,	-	-
55. Income expended in construction and equipment,	-	-
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	21 miles, 11 chains.	
57. Length of main road in other States, (specifying how much in each,)	-	-
58. Length of single main track,	-	-
59. Length of double main track,	-	-
60. Length of branches owned by the Company, stating whether they have a single or double track, and specifying length in this State, and in each other State,)	-	-
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	-	-
62. Length of roads belonging to other companies operated by this Company,	-	-
63. Total miles of road operated by this Company,	-	-
64. Weight of rail, per yard, in main road,	56 lbs. per yard.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	-	-
66. Maximum grade, with its length, in main road,	-	-
67. Maximum grade, with its length, in branch roads,	-	-
68. Total rise and fall in main road,	-	-
69. Total rise and fall in branch roads,	-	-
70. Shortest radius of curvature, with length of curve, in main road,	-	-
71. Shortest radius of curvature, with length of curve, in branch roads,	-	-
72. Total degrees of curvature in main road,	-	-

73. Total degrees of curvature in branch roads, . . .	-	-
74. Total length of straight line in main road, . . .	-	-
75. Total length of straight-line in branches, . . .	-	-
76. Aggregate length of wooden truss bridges, . . .	-	-
77. Aggregate length of all other wooden bridges, . . .	-	-
78. Aggregate length of iron bridges, . . .	-	-
79. Whole length of road unfenced on both sides, . . .	-	-
80. Number of public ways crossed at grade, . . .	23	-
81. Number of railroads crossed at grade, . . .	-	-
82. Remarks, . . .	-	-
83. Way stations for express trains, . . .	-	-
84. Way stations for accommodation trains, . . .	-	-
85. Flag stations, . . .	-	-
86. Whole number of way stations, . . .	-	-
87. Whole number of flag stations, . . .	-	-
DOINGS DURING THE YEAR.*		
88. Miles run by passenger trains, . . .	22,456	
89. Miles run by freight trains, . . .	14,397	
90. Miles run by other trains, . . .	2,507	
91. Total miles run, . . .		3
92. Number of passengers carried in the cars, . . .	69,580	
93. Number of passengers carried one mile, . . .	599,160	
94. Number of tons of merchandise carried in the cars, . . .	34,469	
95. Number of tons of merchandise carried one mile, . . .	450,437	
96. Number of passengers carried one mile, to and from other roads . . .	439,410	
97. Number of tons carried one mile, to and from other roads, . . .	238,791	
98. Rate of speed adopted for express passenger trains, including stops, . . .	None.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions, . . .	None.	
100. Rate of speed adopted for accommodation trains, . . .	26 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions, . . .	20 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	20 miles per hour.	
103. Average rate of speed adopted for freight trains, including stops, . . .	9 miles per hour.	
104. Estimated weight, in tons, of passenger cars (not including passengers) hauled one mile, . . .	-	-
105. Estimated weight, in tons, of merchandise cars, (not including freight) hauled one mile, . . .	-	-
EXPENDITURES FOR WORKING THE ROAD.*		
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron, . . .	} Operated by the H tonic R. R. Co.	
107. For repairs of wooden bridges, . . .		
108. For wages of switchmen, average per month, . . . \$	} Total.	
109. For wages of gate-keepers, average per month, . . .		
110. For wages of signal-men, average per month, . . .		
111. For wages of watchmen, average per month, . . .		
112. Number of men employed, exclusive of those engaged in construction, . . .		

* All items under the headings marked with an asterisk, are required by law for "the total road operated by this company."

- | | | |
|---|---|---|
| 113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,) | - | - |
| 114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses, | - | - |
| 115. Total for maintenance of way, | - | - |

MOTIVE POWER AND CARS.

- | | | |
|---|---|---|
| 116. For repairs of locomotives, | } | The Houstonic Railroad Co. defrays such expenses. |
| 117. For new locomotives, to cover depreciation, | | |
| 118. For repairs of passenger cars, | | |
| 119. For new passenger cars, to cover depreciation, | | |
| 120. For repairs of merchandise cars, | | |
| 121. For new merchandise cars, to cover depreciation, | | |
| 122. For repairs of gravel and other cars, | | |
| 123. Total for maintenance of motive power and cars, | | |
| 124. Number of engines, | | |
| 125. Number of passenger cars, | | |
| 126. Number of baggage cars, | | |
| 127. Number of merchandise cars, | | |
| 128. Number of gravel cars, | | |

MISCELLANEOUS.*

- | | | |
|---|---|---|
| 129. For fuel used by engines during the year, viz. :— | | |
| 1. Wood, number of cords, Cost of the same, | - | - |
| 2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) Cost of same, | - | - |
| 130. For oil used by cars and engines, | - | - |
| 131. For waste and other material for cleaning, | - | - |
| 132. For salaries, wages, and incidental expenses, chargeable to passenger department, | - | - |
| 133. For salaries, wages, and incidental expenses, chargeable to freight department, | - | - |
| 134. For gratuities and damages, | - | - |
| 135. For taxes and insurance, | - | - |
| 136. For ferries, | - | - |
| 137. For repairs of station buildings, aqueducts, fixtures, furniture, | - | - |
| 138. For renewals of iron, including laying down, | - | - |
| 139. For new iron laid down, deducting the value of old iron taken up, | - | - |
| 140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company, | - | - |
| 141. For amount paid other companies, as rent for use of their roads, specifying each company, | - | - |
| 142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items, | - | - |
| 143. Total miscellaneous, | - | - |
| 144. Total expenditures for working the road, | - | - |
| 145. Total amount of interest paid during the year, | - | - |

INCOME DURING THE YEAR.*

- | | | |
|---|---|--|
| 146. For <i>Passengers</i> :— | } | Leased to the Houstonic Railroad for 7 per cent. of the capital. |
| 1. On main road, including branches owned by company, | | |
| 2. To and from other roads, specifying what, | | |

* See note on preceding page.

147. *For Freight:—*

1. On main road, and branches owned by company,	} See preceding page.	
2. To and from other connecting roads,		
148. U. S. mails,		—
149. Rents,	\$42,000 00	\$42,000 00
150. Total income,		\$42,000 00
151. Net earnings, after deducting expenses,	—	—

DIVIDENDS.

152. 7 per cent. Total, [less taxes,]		\$42,000 00
[State tax,]	\$6,984 00	
[Gov't tax,]	1,722 80	
[Net paid to stockholders,]		\$33,293 20

153. Surplus not divided,	—	—
154. Surplus last year,	—	—
155. Total surplus; cash and loans, ; stocks and bonds, ; real estate, fuel,	—	—

ESTIMATED DEPRECIATION BEYOND THE RENEWALS,
VIZ:—

156. Of road and bridges,	—	—
157. Buildings,	—	—
158. Engines and cars,	—	—

MORTGAGE DEBTS.

159. Amount of debts secured by mortgage of road and franchise, or any property of the corporation, per last report,	—	—
160. Mortgage debt paid since last report,	—	—
161. Increase of mortgage debt since last report,	—	—
162. Present amount of mortgage debts,	—	—
163. Number of mortgages on road and franchise, or any property of the corporation,	—	—

D. LEAVITT,
W. H. BARNUM,
SAM'L WILLETS,

Directors of the Housatonic Railroad Corp.

BRIDGEPORT, Ct., ss. October 19, 1870. Then personally appeared D. Leavitt, W. H. Barnum and Samuel Willets, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

C. K. AVERILL, *Notary Public*

REPORT

OF THE

BOSTON AND LOWELL RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	\$3,380,000 00
2. Number of shares of capital stock issued,	4,430
3. Increase of capital, since last report,	\$20,000 00
4. Capital paid in, per last report,	2,195,000 00
5. Capital paid in, since last report,	20,000 00
6. Total amount of capital stock paid in,	2,215,000 00
7. Amount realized in cash value for stock issued,	2,215,000 00
8. Funded debt, per last report,	275,000 00
9. Funded debt, paid since last report,	20,000 00
10. Funded debt, increase of, since last report,	Nothing.
11. Total present amount of funded debt,	255,000 00
12. Floating debt, per last report,	104,674 40
13. Floating debt, paid since last report,	-
14. Floating debt, increase of, since last report,*	280,170 06
15. Total present amount of floating debt,	384,844 46
16. Total present amount of funded and floating debt,	639,844 46
17. Whole amount in cash value realized from funded and floating debts,	639,844 46
18. Whole amount in cash value realized from stock and debts,	2,854,844 46
19. Average rate of interest per annum paid during the year,	Six per cent.
20. Maximum amount of debts during the year,	384,844 46
COST OF ROAD AND EQUIPMENT.	
21. For graduation and masonry, per last report,	\$453,117 14
22. For graduation and masonry, paid during the past year,	-
23. Total am't expended for graduation and masonry,	\$453,117 14
24. For wooden bridges, per last report,	119,557 16
25. For wooden bridges, paid during the past year,	-
26. Total amount expended for wooden bridges,	119,557 16
27. Total amount expended for iron bridges, (if any,)	-
28. For superstructure, including iron, per last report,	367,824 62
29. For superstructure, including iron, paid during the past year,	-

* This increase of floating debt has been,—

For the purchase of the Lexington and Arlington Branch, \$140,000 00

For the purchase of the Stoneham Branch, 50,000 00

And for expenditure in the connection of the Lexington Branch with the Trunk Road, now under construction.

30. Total amount expended for superstructure, including iron,		\$367,
31. For stations, buildings and fixtures, per last report,	\$922,049 31	
32. For stations, buildings and fixtures, paid during the past year,	-	-
33. Total amount expended for stations, buildings and fixtures,		922,
34. For land, land-damages and fences, per last report,	560,047 46	
35. For land, land-damages and fences, paid during the past year,	-	-
36. Total amount expended for land, land-damages and fences,		560,
37. For locomotives, per last report,	92,801 76	
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,		92,
40. For passenger and baggage cars, per last report,	34,204 75	
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,		34,
43. For merchandise cars, per last report,	56,338 85	
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,		56,
46. For engineering, per last report,	47,359 07	
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		47,
49. For agencies and other expenses, per last report,	-	-
50. For agencies and other expenses, paid during the past year,	-	-
51. Total amount expended for agencies and other expenses,	-	-
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,		2,653,
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans, \$529,882.53; stocks and bonds, [Nothing;] real estate, \$87,374.64; fuel, [and working materials,] \$131,618.88,	748,876 05	
55. Income expended in construction and equipment,	183,300 12	
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	26½ miles.	
57. Length of main road in other States, (specifying how much in each,)	None.	
58. Length of single main track,	None.	
59. Length of double main track,	26½ miles.	
60. Length of branches owned by the Company, stating whether they have a single or double track, and specifying length in this State, and in each other State,)	10 8-10 miles single.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	19 miles.	
62. Length of roads belonging to other companies operated by this Company,	29 miles.	
63. Total miles of road operated by this Company,	65½ miles.	
64. Weight of rail, per yard, in main road,	55 to 60 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	56, 57, 58, 60 lbs.	
66. Maximum grade, with its length, in main road,	30 ft. per mile, ¼ mi.	
67. Maximum grade, with its length, in branch roads,	54 ft., 5,000 ft.	
68. Total rise and fall in main road,	189 ft.	

69. Total rise and fall in branch roads,	73 feet.	
70. Shortest radius of curvature, with length of curve, in main road,	1,654 ft. ; 2,800 ft. radius.	
71. Shortest radius of curvature, with length of curve, in branch roads,	622 ft. ; 1,957 ft. radius.	
72. Total degrees of curvature in main road,	665°	
73. Total degrees of curvature, in branch roads,	108°	
74. Total length of straight line, in main road,	18½ miles,	
75. Total length of straight line, in branches,	1¼ miles.	
76. Aggregate length of wooden truss bridges,	285 feet.	
77. Aggregate length of all other wooden bridges,	3,621 feet.	
78. Aggregate length of iron bridges,	None.	
79. Whole length of road unfenced on both sides,	None.	
80. Number of public ways crossed at grade,	27	
81. Number of railroads crossed at grade,	None.	
82. Remarks,	-	-
83. Way stations for express trains,	-	-
84. Way stations for accommodation trains,	16	-
85. Flag stations,	-	-
86. Whole number of way stations,	-	-
87. Whole number of flag stations,	-	-
DOINGS DURING THE YEAR.*		
88. Miles run by passenger trains,	264,877	
89. Miles run by freight trains,	235,794	
90. Miles run by other trains,	Included above.	
91. Total miles run,		500,671
92. Number of passengers carried in the cars,	1,265,431	
93. Number of passengers carried one mile,	16,693,212	
94. Number of tons of merchandise carried in the cars,	432,610	
95. Number of tons of merchandise carried one mile,	11,555,111	
96. Number of passengers carried one mile, to and from other roads,	4,061,567	
97. Number of tons carried one mile, to and from other roads,	7,341,496	
98. Rate of speed adopted for express passenger trains, including stops,	30 miles per hour.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	30 miles per hour.	
100. Rate of speed adopted for accommodation trains,	25 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	25 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	25 miles per hour.	
103. Average rate of speed adopted for freight trains, including stops,	10 miles per hour.	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile,	8,246,606	
105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile,	17,382,666	
EXPENDITURES FOR WORKING THE ROAD.*		
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$118,223 50	
107. For repairs of wooden bridges,	11,695 91	

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

108. For wages of switchmen, average per month,	\$45 00	Total,	\$20,777 75
109. For wages of gate-keepers, average per month,	35 00		
110. For wages of signal-men, average per month,	35 00		
111. For wages of watchmen, average per month,	45 00		
112. Number of men employed, exclusive of those engaged in construction,	571		
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	2,086 86		
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses, [and freight houses,]	29,532 18		
115. Total for maintenance of way,			\$182,31

MOTIVE POWER AND CARS.

116. For repairs of locomotives,	\$27,914 37
117. For new locomotives, to cover depreciation,	10,074 00
118. For repairs of passenger cars,	26,736 46
119. For new passenger cars to cover depreciation,	4,249 73
120. For repairs of merchandise cars,	25,648 98
121. For new merchandise cars to cover depreciation,	18,566 28
122. For repairs of gravel and other cars,	Answered in 120.
123. Total for maintenance of motive power and cars,	\$112,18
124. Number of engines,	32
125. Number of passenger cars,	38
126. Number of baggage cars,	18
127. Number of merchandise cars,	550
128. Number of gravel cars,	230

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz. :— [Sundry purposes,]	\$10,359 16
1. Wood, number of cords, 5,684. Cost of the same,	31,167 86
2. Coal, number of tons, (reckoning 2 240 lbs. to the ton,) 6,054. Cost of the same,	50,985 36
130. For oil used by cars and engines,	5,739 96
131. For waste and other material for cleaning,	8,609 94
132. For salaries, wages and incidental expenses, chargeable to passenger department,	51,628 05
133. For salaries, wages and incidental expenses, chargeable to freight department,	103,611 39
134. For gratuities and damages,	12,084 87
135. For taxes and insurance, [including U. S. taxes,]	7,417 86
136. For ferries,	Nothing.
137. For repairs of station buildings, aqueducts, fixtures, furniture,	9,574 22
138. For renewals of iron, including laying down,	} 22,344 97
139. For new iron laid down, deducting the value of old iron taken up,	
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	Nothing.

* See note on preceding page.

141. For amount paid other companies, as rent for use of their roads, specifying each company, [Salem & Lowell R. R., \$13,815.40; Lowell & Lawrence R. R., \$14,179.70; Stony Brook, \$12,013.80.]	\$39,508 90	
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	34,135 66	
143. Total miscellaneous,		\$453,363 22
144. Total expenditures for working the road,		747,874 24
145. Total amount of interest paid during the year,		14,186 97
INCOME DURING THE YEAR.* [10 MONTHS.]		
146. For Passengers :—		
1. On main road, including branches owned by company,	\$322,860 98	
2. To and from other roads, specifying what,†	69,706 08	
147. For Freight :—		
1. On main road and branches owned by Co.,	278,139 40	
2. To and from other connecting roads,	221,265 71	
148. United States mails, [\$5,417.08; expresses, \$15,564.28.]	20,981 36	
149. Rents, [interest on sinking fund.]	21,800 36	
150. Total income,		\$934,763 89
151. Net earnings, after deducting expenses,	172,692 68	
DIVIDENDS.		
152. 4 per cent. Total,		\$88,600 00
153. Surplus not divided,	\$84,092 68	
154. Surplus last year,	—	—
155. Total surplus; [sinking fund, \$598,205.20; cash and loans, \$131,677.33; stocks and bonds, real estate, \$37,374.64; fuel, [and working materials,] \$131,618.88,		748,876 05
ESTIMATED DEPRECIATION BEYOND THE RENEWALS,		
Viz. :		
156. Of road and bridges,	—	—
157. Buildings,	—	—
158. Engines and cars,	—	—
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage, of road and franchise or any property of the corporation, per last report,	—	—
160. Mortgage debt paid since last report,	—	—
161. Increase of mortgage debt since last report,	—	—
162. Present amount of mortgage debts,	—	—
163. Number of mortgages, on road and franchise or any property of the corporation,	—	—

NOTE.—The above includes the business of the Lexington and Arlington Railroad and the Stoneham Branch Railroad, purchased by this corporation.

* Worcester and Nashua R. R., and its Western connections; Boston and Maine R. R., and its Eastern connections; Nashua and Lowell R. R., and Fitchburg B. R., and their Northern connections.

ACCIDENTS.

January 14, 1870.—Sylvester C. Smith, an employé, was fatally injured while shifting cars at Lowell.

February 7.—Joseph L. Shaw, in carelessly stepping from the car while in motion, at East Cambridge, fell under the train and received injuries which resulted fatally.

February 12.—John Buckley, an employé, was caught between a car and platform at Boston and severely injured.

February 15.—T. P. Atkinson, an employé, slipped from a freight car at Winchester and was injured.

March 8.—Alvin A. Durgin was thrown from the platform of a car while in motion, while carelessly and unlawfully thereon, at Lowell, and was severely injured.

March 8.—William Fortis was caught between a car and a building at Lowell and was injured.

March 31.—William Menkman, an employé, while attempting to get upon a car in motion, at Lowell, fell beneath the cars and was instantly killed.

May 2.—Walter M. Wade, a fireman, was injured while at work on his engine at College Hill Station.

June 18.—Edward Cotter, an employé, was fatally injured while coupling cars at Boston.

July 4.—Barney McShafer jumped from a train in motion at Boston and was severely injured.

August 2.—A W. Davis, while crossing the track in Somerville, was struck by a passing train and instantly killed.

August 30.—Isaac W. Day while crossing the track in Medford was caught between two trains and instantly killed.

September 23.—Dennis Cronin was found dead upon the track at Winchester. He was supposed to have been killed by a train in the night.

F. B. CROWNINSHIELD,

J. G. ABBOTT,

H. HOSFORD,

EDWARD W. CODMAN,

Directors of the Boston and Lowell Railroad Corporation.

SUFFOLK, ss. November 18, 1870. Then personally appeared F. B. Crowninshield, J. G. Abbott and Edward W. Codman, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

C. E. A. BARTLETT, *Justice of the Peace.*

SUFFOLK, ss. November 19, 1870. Then personally appeared H. Hosford, and made oath to the truth of the foregoing statement by him subscribed.

Before

C. E. A. BARTLETT, *Justice of the Peace.*

R E P O R T

OF THE

EASTON BRANCH RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$50,000 00
2. Number of shares of capital stock issued,	495	
3. Increase of capital since last report,	None.	
4. Capital paid in, per last report,	\$49,662 50	
5. Capital paid in since last report,	None.	
6. Total amount of capital stock paid in,	—	—
7. Amount realized in cash value for stock issued,	None.	
8. Funded debt, per last report,	None.	
9. Funded debt paid since last report,	None.	
10. Funded debt, increase of, since last report,	None.	
11. Total present amount of funded debt,	None.	
12. Floating debt, per last report,	None.	
13. Floating debt paid since last report,	None.	
14. Floating debt, increase of, since last report,	None.	
15. Total present amount of floating debt,	None.	
16. Total present amount of funded and floating debt,	None.	
17. Whole amount in cash value realized from funded and floating debts,	None.	
18. Whole amount in cash value realized from stock and debts,	None.	
19. Average rate of interest per annum paid during the year,	None.	
20. Maximum amount of debts during the year,	None.	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	—	—
22. For graduation and masonry paid during the past year,	—	—
23. Total am't expended for graduation and masonry,		\$15,541 26
24. For wooden bridges, per last report,	Nothing.	
25. For wooden bridges paid during the past year,	None.	
26. Total amount expended for wooden bridges,	Nothing.	
27. Total amount expended for iron bridges, (if any,)	Nothing.	
28. For superstructure, including iron, per last report,	—	—
29. For superstructure, including iron, paid during the past year,	—	—
30. Total amount expended for superstructure, including iron,		24,416 83
31. For stations, buildings and fixtures, per last report,	—	—
32. For stations, buildings and fixtures, paid during the past year,	Nothing.	

33. Total amount expended for stations, buildings and fixtures,		\$7,101
34. For land, land-damages and fences, per last report,		
35. For land, land-damages and fences paid during the past year,	-	-
36. Total amount expended for land, land-damages, and fences,	-	-
37. For locomotives, per last report,	-	-
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,	-	-
40. For passenger and baggage cars, per last report,	-	-
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,	-	-
43. For merchandise cars, per last report,	-	-
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,	-	-
46. For engineering, per last report,	-	-
47. For engineering paid during the past year,	Nothing.	
48. Total amount expended for engineering,		1,287
49. For agencies and other expenses, per last report,	Nothing.	
50. For agencies and other expenses paid during the past year,	Nothing.	
51. Total amount expended for agencies and other expenses,		56,144
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,	-	-
54. Amount of assets or property held by the corporation, in addition to the cost of the road; cash and loans,; stocks and bonds,; real estate,; fuel,	-	-
55. Income expended in construction and equipment,	-	-
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	3½ miles, 177 feet.	
57. Length of main road in other States, (specifying how much in each,)	Nothing.	
58. Length of single main track,	3½ miles, 177 feet.	
59. Length of double main track,	None.	
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	Nothing.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	None.	
62. Length of road belonging to other companies, operated by this Company,	-	-
63. Total miles of road operated by this Company,	3½ miles, 177 feet.	
64. Weight of rail, per yard, in main road,	56 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	None.	
66. Maximum grade, with its length, in main road,	76 6-10 feet for 3,400 feet.	
67. Maximum grade, with its length, in branch roads,	None.	
68. Total rise and fall in main road,	118 feet.	
69. Total rise and fall in branch roads,	None.	
70. Shortest radius of curvature, with length of curve, in main road,	716 feet for 447 feet.	
71. Shortest radius of curvature, with length of curve in branch roads,	None.	
72. Total degrees of curvature, in main road,	205°	

73. Total degrees of curvature in branch roads, . . .	None.
74. Total length of straight line in main road, . . .	1½ miles, 886 feet.
75. Total length of straight line in branches, . . .	None.
76. Aggregate length of wooden truss bridges, . . .	None.
77. Aggregate length of all other wooden bridges, . . .	None.
78. Aggregate length of iron bridges, . . .	None.
79. Whole length of road unfenced on both sides, . . .	None.
80. Number of public ways crossed at grade, . . .	3
81. Number of railroads crossed at grade, . . .	None.
82. Remarks, . . .	None.
83. Way stations for express trains, . . .	None.
84. Way stations for accommodation trains, . . .	None.
85. Flag stations, . . .	None.
86. Whole number of way stations, . . .	None.
87. Whole number of flag stations, . . .	None.

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains, . . .	Included in Report of Old Colony and Newport Railway Company.
89. Miles run by freight trains, . . .	
90. Miles run by other trains, . . .	
91. Total miles run, . . .	
92. Number of passengers carried in the cars, . . .	
93. Number of passenger carried one mile, . . .	
94. Number of tons of merchandise carried in the cars, . . .	
95. Number of tons of merchandise carried one mile, . . .	
96. Number of passengers carried one mile, to and from other roads, . . .	
97. Number of tons carried one mile, to and from other roads, . . .	
98. Rate of speed adopted for express passenger trains, including stops, . . .	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions, . . .	
100. Rate of speed adopted for accommodation trains, . . .	
101. Rate of speed actually attained by accommodation trains, including stops and detentions, . . .	
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	
103. Average rate of speed adopted for freight trains, including stops, . . .	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile, . . .	Included in Report of Old Colony and Newport Railway Company.
105. Estimated weight in tons of merchandise cars (not including freight,) hauled one mile, . . .	

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron, . . .	Included in Report of Old Colony and Newport Railway Company.
107. For repairs of wooden bridges, . . .	
108. For wages of switchmen, average per month, . . . \$	
109. For wages of gate-keepers, average per month, . . .	
110. For wages of signal-men, average per month, . . .	
111. For wages of watchmen, average per month, . . .	

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

112. Number of men employed, exclusive of those engaged in construction, . . .
 113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,) . . .
 114. For repairs of fences, gates, houses for signalmen, gate-keepers, switchmen, tool-houses, . . .
 115. Total for maintenance of way, . . .

Included in Report of O
Colony and Newpo
Railway Company.

MOTIVE POWER AND CARS.

116. For repairs of locomotives, . . .
 117. For new locomotives, to cover depreciation, . . .
 118. For repairs of passenger cars, . . .
 119. For new passenger cars, to cover depreciation, . . .
 120. For repairs of merchandise cars, . . .
 121. For new merchandise cars, to cover depreciation, . . .
 122. For repairs of gravel and other cars, . . .
 123. Total for maintenance of motive power and cars, . . .
 124. Number of engines, . . .
 125. Number of passenger cars, . . .
 126. Number of baggage cars, . . .
 127. Number of merchandise cars, . . .
 128. Number of gravel cars, . . .

Included in Report of O
Colony and Newpo
Railway Company.

None.
None.
None.
None.
None.

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz. :—
 1. Wood, number of cords, . . . Cost of the same, . . .
 2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) . . . Cost of same, . . .
 130. For oil used by cars and engines, . . .
 131. For waste and other material for cleaning, . . .
 132. For salaries, wages and incidental expenses, chargeable to passenger department, . . .
 133. For salaries, wages and incidental expenses, chargeable to freight department, . . .
 134. For gratuities and damages, . . .
 135. For taxes and insurance, . . .
 136. For ferries, . . .
 137. For repairs of station buildings, aqueducts, fixtures, furniture, . . .
 138. For renewals of iron, including laying down, . . .
 139. For new iron laid down, deducting the value of old iron taken up, . . .
 140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company, . . .
 141. For amount paid other companies, as rent for use of their roads, specifying each company, . . .
 142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items, . . .
 143. Total miscellaneous, . . .
 144. Total expenditures for working the road, . . .
 145. Total amount of interest paid during the year, . . .

Included in Report of O
Colony and Newpo
Railway Company.

* See note on preceding page.

INCOME DURING THE YEAR.*	
146. <i>For Passengers</i> :—	
1. On main road, including branches owned by company,	} Included in Report of Old Colony and Newport Railway Company.
2. To and from other roads, specifying what,	
147. <i>For Freight</i> :—	
1. On main road and branches owned by Co.,	
2. To and from other connecting roads,	
148. U. S. mails,	
149. Rents,	
150. Total income,	
151. Net earnings, after deducting expenses,	
DIVIDENDS.	
152. per cent. Total,	None made.
153. Surplus not divided,	None.
154. Surplus last year,	None.
155. Total surplus; cash and loans, ; stocks and bonds, ; real estate, ; fuel,	None.
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—	
156. Of road and bridges,	Nothing.
157. Buildings,	Nothing.
158. Engines and cars,	Nothing.
MORTGAGE DEBTS.	
159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last report,	None.
160. Mortgage debt paid since last report,	None.
161. Increase of mortgage debts since last report,	None.
162. Present amount of mortgage debts,	None.
163. Number of mortgages, on road and franchise or any property of the Corporation,	None.

OLIVER AMES,
 ONSLOW STEARNS,
 URIEL CROCKER,

Directors of the Easton Branch Railroad Corporation.

SUFFOLK, ss. November 2, 1870. Then personally appeared Onslow Stearns, Uriel Crocker and Oliver Ames, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

JOHN M. WASHBURN, *Justice of the Peace.*

REPORT

OF THE

FITCHBURG RAILROAD CORPORATION

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	-	-
2. Number of shares of capital stock issued,	36,400	-
3. Increase of capital since last report,	-	-
4. Capital paid in, per last report,	\$3,540,000 00	
5. Capital paid in since last report,	100,000 00	
6. Total amount of capital stock paid in,	\$3,640,000 00	
7. Amount realized in cash value for stock issued,	3,872,497 92	
8. Funded debt, per last report,		This Corporation has no debt.
9. Funded debt paid since last report,		
10. Funded debt, increase of, since last report,		
11. Total present amount of funded debt,		
12. Floating debt, per last report,		
13. Floating debt paid since last report,		
14. Floating debt, increase of, since last report,		
15. Total present amount of floating debt,		
16. Total present amount of funded and floating debt,		
17. Whole amount in cash value realized from funded and floating debts,		
18. Whole amount in cash value realized from stock and debts,		
19. Average rate of interest per annum paid during the year,		
20. Maximum amount of debts during the year,		
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$757,696 16	
22. For graduation and masonry paid during the past year,	Nothing.	
23. Total amount expended for graduation and masonry,		\$757,696 16
24. For wooden bridges, per last report,	300,000 00	
25. For wooden bridges paid during the past year,	20,000 00	
26. Total amount expended for wooden bridges,		320,000 00
27. Total amount expended for iron bridges, (if any,)	Nothing.	
28. For superstructure, including iron, per last report,	906,000 00	
29. For superstructure, including iron, paid during the past year,	Nothing.	
30. Total amount expended for superstructure, including iron,		906,000 00
31. For stations, buildings and fixtures, per last report,	446,000 00	
32. For stations, buildings and fixtures paid during the past year,	80,000 00	

33. Total amount expended for stations, buildings and fixtures,	\$525,000 00
34. For land, land-damages and fences, per last report,	\$732,966 27
35. For land, land-damages and fences paid during the past year,	Nothing.
36. Total amount expended for land, land-damages, and fences,	732,966 27
37. For locomotives, per last report,	150,000 00
38. For locomotives paid during the past year,	Nothing.
39. Total amount expended for locomotives,	150,000 00
40. For passenger and baggage cars, per last report,	31,000 00
41. For passenger and baggage cars paid during the past year,	Nothing.
42. Total amount expended for passenger and baggage cars,	31,000 00
43. For merchandise cars, per last report,	169,149 32
44. For merchandise cars paid during the past year,	Nothing.
45. Total amount expended for merchandise cars,	169,149 32
46. For engineering, per last report,	49,188 25
47. For engineering paid during the past year,	Nothing.
48. Total amount expended for engineering,	49,188 25
49. For agencies and other expenses, per last report,	Nothing.
50. For agencies and other expenses, paid during the past year,	Nothing.
51. Total amount expended for agencies and other expenses,	Nothing.
52. Amounts of discounts or other sacrifices on stock and bonds issued,	Nothing.
53. Total cost of road and equipment,	3,640,000 00
54. Amount of assets or property held by the corporation in addition to the cost of the road; cash and loans, \$200,661.18; stocks and bonds,; real estate, \$201,181.04; fuel, \$39,341; [stock materials, \$60,047.11].	501,230 33
55. Income expended in construction and equipment,	-

CHARACTERISTICS OF ROAD.

56. Length of main road in this State,	51 miles.
57. Length of main road in other States, (specifying how much in each,)	None.
58. Length of single main track,	None.
59. Length of double main track,	51 miles.
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	42½ miles single track; 33½ miles in Massachusetts; 9½ miles in New Hampshire.
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	31 13-100 miles.
62. Length of roads belonging to other companies operated by this Company,	None.
63. Total miles of road operated by this Company,	93½ miles.
64. Weight of rail, per yard, in main road,	56 to 63 lbs.
65. Weight of rail, per yard, in branch roads (specify the different weights per yard,)	49, 50, 53 and 56 lbs.
66. Maximum grade, with its length, in main road,	40 ft., 5 12-100 miles in the aggregate, made up of 4 separate planes in different parts of the road.
67. Maximum grade, with its length, in branch roads,	97 ft.; 3,200 ft. long.
68. Total rise and fall in main road,	739½ ft. rise; 313½ ft. fall.
69. Total rise and fall in branch roads,	713½ feet.

70. Shortest radius of curvature, with length of curve, in main road,	818 ft., 500 ft. long.
71. Shortest radius of curvature, with length of curve, in branch roads,	385 ft., 530 ft. long.
72. Total degrees of curvature in main road,	1,694 ^o
73. Total degrees of curvature in branch roads,	2,428 ^o
74. Total length of straight line in main road,	34 67-100 miles.
75. Total length of straight line in branches,	22 miles.
76. Aggregate length of wooden truss bridges,	1,653 feet.
77. Aggregate length of all other wooden bridges,	6,054 feet.
78. Aggregate length of iron bridges,	None.
79. Whole length of road unfenced on both sides,	-
80. Number of public ways crossed at grade,	126
81. Number of railroads crossed at grade,	4
82. Remarks,	-
83. Way stations for express trains,	6
84. Way stations for accommodation trains,	9
85. Flag stations,	16
86. Whole number of way stations,	13 on main road and br
87. Whole number of flag stations,	31 on main road and br

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains,	273,523	
89. Miles run by freight trains,	248,288	
90. Miles run by other trains,	16,277	
91. Total miles run,		538
92. Number of passengers carried in the cars,	1,630,975	
93. Number of passengers carried one mile,	20,328,234	
94. Number of tons of merchandise carried in the cars,	528,846	
95. Number of tons of merchandise carried one mile,	13,563,559	
96. Number of passengers carried one mile, to and from other roads,	5,202,918	
97. Number of tons carried one mile, to and from other roads,	9,536,336	
98. Rate of speed adopted for express passenger trains, including stops,	27 $\frac{1}{2}$ miles per hour.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	27 $\frac{1}{2}$ miles per hour.	
100. Rate of speed adopted for accommodation trains,	21 $\frac{1}{2}$ miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	21 $\frac{1}{2}$ miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	17 miles per hour.	
103. Average rate of speed adopted for freight trains, including stops,	11 miles per hour.	
104. Estimated weight, in tons, of passenger cars, (not including passengers,) hauled one mile,	19,075,259	
105. Estimated weight, in tons, of merchandise cars, (not including freight,) hauled one mile,	21,029,242	

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron,	\$113,165 16
107. For repairs of wooden bridges,	16,884 18

* All items under the headings marked with an asterisk, are required by law for "the total road operated by this company."

108. For wages of switchmen, average per month,	\$42 95	Total,	\$19,958 64
109. For wages of gate-keepers, average per month,	26 11		
110. For wages of signal-men, average per month,	39 44		
111. For wages of watchmen, average per month,	46 24		
112. Number of men employed, exclusive of those engaged in construction,	652		
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	3,606 25		
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,	2,720 60		
115. Total for maintenance of way,			\$156,329 72
MOTIVE POWER AND CARS.			
116. For repairs of locomotives,	\$69,480 43		
117. For new locomotives, to cover depreciation,	24,000 00		
118. For repairs of passenger cars,	27,782 07		
119. For new passenger cars, to cover depreciation,	8,300 00		
120. For repairs of merchandise cars,	51,463 26		
121. For new merchandise cars, to cover depreciation,	5,000 00		
122. For repairs of gravel and other cars,	2,447 34		
123. Total for maintenance of motive power and cars,			\$183,473 10
124. Number of engines,	35		
125. Number of passenger cars,	42		
126. Number of baggage cars,	11		
127. Number of merchandise cars,	{ 899 eight-wheel and 331 four-wheel.		
128. Number of gravel cars,		36	
MISCELLANEOUS.*			
129. For fuel used by engines during the year, viz.:—			
1. Wood, No. of cords, 3,112½. Cost of the same,	\$19,523 32		
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 8,626½. Cost of same,	65,790 58		
130. For oil used by cars and engines,	6,684 24		
131. For waste and other material for cleaning,	3,027 86		
132. For salaries, wages and incidental expenses, chargeable to passenger department,	79,828 68		
133. For salaries, wages and incidental expenses, chargeable to freight department,	106,743 31		
134. For gratuities and damages,	9,043 53		
135. For taxes and insurance,	84,014 70		
136. For ferries,	Nothing.		
137. For repairs of station buildings, aqueducts, fixtures, furniture,	36,092 55		
138. For renewals of iron, including laying down,	23,548 97		
139. For new iron laid down, deducting the value of old iron taken up,	39,313 12		
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	Nothing.		
141. For amount paid other companies, as rent for use of their roads, specifying each company,	Nothing.		
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	20,238 15		

* See note on preceding page.

143. Total miscellaneous,	\$493,848 6
144. Total expenditures for working the road,	833,651 7
145. Total amount of interest paid during the year,	Nothing.

INCOME DURING THE YEAR.*

146. <i>For Passengers</i> :—		
1. On main road, including branches owned by company,	\$260,703 08	\$468,673 8
2. To and from other roads specifying what, [Worcester & Nashua, Stony Brook, Vermont & Mass., and connections,]	107,971 81	
147. <i>For Freight</i> :—		
1. On main road and branches owned by company,	319,124 63	584,860 2
2. To and from other connecting roads,	265,235 62	
148. U. S. mails,	8,041 67	
149. Rents, [and interest,]	24,980 46	
150. Total income,		1,085,937 3
151. Net earnings, after deducting expenses,	252,295 49	

DIVIDENDS.

152. 8 per cent. [and tax.] Total,		\$298,105 3
153. Surplus not divided,	\$103,232 84	
154. Surplus last year, [\$547,050.44; less January dividend, \$149,052.65,]	397,997 79	
155. Total surplus; cash and loans, \$200,661.18; stocks and bonds,; real estate, \$201,181.04; fuel, \$39,841; [stock materials, \$60,047.11,]		501,230 0

ESTIMATED DEPRECIATION BEYOND THE RENEWALS,
VIZ. :—

156. Of road and bridges,	} Nothing.
157. Buildings,	
158. Engines and cars,	

MORTGAGE DEBTS.

159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last Report,	} No debt.
160. Mortgage debt paid since last Report,	
161. Increase of mortgage debt since last Report, . .	
162. Present amount of mortgage debts,	
163. Number of mortgages on road and franchise, or any property of the Corporation,	

ACCIDENTS.

December 12, 1869.—A child named W. H. Mills, while upon the track near Prospect Street station, was struck by a car of the special train and fatally injured.

January 20, 1870.—E. A. Newton, brakeman, fell from a freight car and was killed, while shackling cars at West Acton.

January 28.—A. J. Paine was instantly killed at East Cambridge while attempting to cross the track in front of an express train.

April 4.—Charles B. Ford, engineman, was scalded by the explosion of the boiler of the engine "Concord," which was making the stop required before crossing the Boston, Clinton and Fitchburg Railroad.

April 19.—Edward Stevens, fireman, fell from the engine "Assabet" (while oiling the cylinder), near Groton Junction, and was killed.

April 26.—A young child, named McGannes, had a leg broken by an engine. He was playing upon the track near Mt. Auburn.

July 14.—Charles A. Smith jumped from the 7.30 A. M. express train on Prison Point bridge, and was killed.

September 6.—James Hulehy was run over and fatally injured while walking upon the track in Fitchburg.

September 8.—John McCarty was found lying upon the track with one arm over the rail, near Stony Brook. He was taken to the hospital, where his arm was amputated. He was intoxicated.

September 10.—John Gallagher jumped from a baggage car, near the Lowell Railroad crossing, and was severely injured.

WM. B. STEARNS,
ALVAH CROCKER,
W. E. FAULKNER,
WILLIAM A. BRIGHAM,
P. B. BRIGHAM,

Directors of the Fitchburg Railroad Corporation.

SUFFOLK, ss. November 21, 1870. Then personally appeared Alvah Crocker, W. E. Faulkner, Wm. A. Brigham and P. B. Brigham, and severally made oath to the truth of the foregoing statement by them subscribed, according to their best knowledge and belief.

Before

WM. B. STEARNS, *Justice of the Peace.*

MIDDLESEX, ss. November 21, 1870. Then personally appeared W. B. Stearns, and made oath to the truth of the foregoing statement by him subscribed, according to his best knowledge and belief.

WM. S. STEARNS, *Justice of the Peace.*

REPORT

OF THE

HARTFORD AND NEW HAVEN RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,*	\$6,300,000 00	
2. Number of shares of capital stock issued,	63,000	
3. Increase of capital since last report,	\$3,000,000 00	
4. Capital paid in, per last report,	3,300,000 00	
5. Capital paid in since last report,	1,500,000 00	
6. Total amount of capital stock paid in,	4,800,000 00	
7. Amount realized in cash value for stock issued,	750,000 00	
8. Funded debt, per last report,	927,000 00	
9. Funded debt paid since last report,	135,000 00	
10. Funded debt, increase of, since last report,	-	-
11. Total present amount of funded debt,		†744,000 00
12. Floating debt, per last report,	-	-
13. Floating debt paid since last report,	-	-
14. Floating debt, increase of, since last report,	-	-
15. Total present amount of floating debt,	-	-
16. Total present amount of funded and floating debt,	-	-
17. Whole amount in cash value realized from funded and floating debts,	-	-
18. Whole amount in cash value realized from stock and debts,	-	-
19. Average rate of interest per annum paid during the year,	6 per cent.	
20. Maximum amount of debts during the year,	744,000 00	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	-	-
[Cost road in Conn.,]	\$3,148,789 41	
22. For graduation and masonry paid during the past year,	-	-
23. Total am't expended for graduation and masonry,	-	-
24. For wooden bridges, per last report,	-	-
[Cost road in Mass.,]	265,027 66	
25. For wooden bridges paid during the past year,	-	-
26. Total amount expended for wooden bridges,	-	-
[Middletown Branch road,]	197,467 69	
27. Total amount expended for iron bridges, (if any,)	-	-
28. For superstructure, including iron, per last report,	-	-
29. For superstructure, including iron, paid during the past year,	-	-

* The capital stock has been merged in the capital stock of the New York and New Haven Railroad Company, according to the provisions of the charter and amendment thereof.

† \$33,000 paid previously, but not reported.

30. Total amount expended for superstructure, including iron,	-	-
31. For stations, buildings and fixtures, per last report,	-	-
32. For stations, buildings and fixtures paid during the past year,	-	-
33. Total amount expended for stations, buildings and fixtures,	-	-
34. For land, land-damages and fences, per last report,	\$66,701	40
35. For land, land-damages and fences paid during the past year,	-	-
36. Total amount expended for land, land-damages, and fences,		\$66,701 40
37. For locomotives, per last report,	}	New locomotives and cars are charged to the general expenses of the road.
38. For locomotives paid during the past year,		
39. Total amount expended for locomotives,		
40. For passenger and baggage cars, per last report,		
41. For passenger and baggage cars paid during the past year,		
42. Total amount expended for passenger and baggage cars,	}	To transportation and general expense account.
43. For merchandise cars, per last report,		
44. For merchandise cars paid during the past year,		
45. Total amount expended for merchandise cars,		
46. For engineering, per last report,		
47. For engineering paid during the past year,	}	
48. Total amount expended for engineering,		
49. For agencies and other expenses, per last report,		
50. For agencies and other expenses paid during the past year,		
51. Total amount expended for agencies and other expenses,		
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,	-	-
54. Amount of assets or property held by the corporation in addition to the cost of the road; cash and loans, . . . ; stocks and bonds, . . . ; real estate, . . . ; fuel,	-	-
55. Income expended in construction and equipment, [Railway, including double track, branch track, depot, bridge, &c.,]	\$3,407,284	76
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	5½	
57. Length of main road in other States, (specifying how much in each,)	Conn. 56 13-100; Mass. 6½.	
58. Length of single main track,	-	
59. Length of double main track,	Conn. 56 13-100; Mass. 6½.	
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	New Britain, 2½ miles; Berlin and Middletown, 10 miles; Hartford Branch, ¼ mile, all single.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	2 48-320	
62. Length of roads belonging to other companies operated by this Company,	-	-
63. Total miles of road operated by this Company,	76	
64. Weight of rail, per yard, in main road,	57 and 62 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	57 and 62 lbs.	
66. Maximum grade, with its length, in main road,	{ 17 58-100 ft., length 52-100 mile.	
67. Maximum grade, with its length in branch roads,	-	-

68. Total rise and fall in main road,	81 61-100	
69. Total rise and fall in branch roads,	-	-
70. Shortest radius of curvature, with length of curve, in main road,	447½ ft.; length, 1-10 mile.	
71. Shortest radius of curvature, with length of curve, in branch roads,	-	-
72. Total degrees of curvature in main road,	277°	
73. Total degrees of curvature in branch roads,	-	-
74. Total length of straight line in main road,	4.25	
75. Total length of straight line in branches,	-	-
76. Aggregate length of wooden truss bridges,	-	-
77. Aggregate length of all other wooden bridges,	-	-
78. Aggregate length of iron bridges,	-	-
79. Whole length of road unfenced on both sides,	-	-
80. Number of public ways crossed at grade,	7	
81. Number of railroads crossed at grade,	-	-
82. Remarks,	-	-
83. Way stations for express trains,	-	-
84. Way stations for accommodation trains,	-	-
85. Flag stations,	1	
86. Whole number of way stations,	-	-
87. Whole number of flag stations,	1	

DOINGS DURING THE YEAR.* [Mass.]

88. Miles run by passenger trains,	290,028	
89. Miles run by freight trains,	208,845	
90. Miles run by other trains,	79,937	
91. Total miles run,		578,810
92. Number of passengers carried in the cars,	346,083	
93. Number of passengers carried one mile,	826,939	
94. Number of tons of merchandise carried in the cars,	269,836	
95. Number of tons of merchandise carried one mile,	1,586,286	
96. Number of passengers carried one mile, to and from other roads,	1,194,432	
97. Number of tons carried one mile, to and from other roads,	1,144,996	
98. Rate of speed adopted for express passenger trains, including stops,	33 miles.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	33 miles.	
100. Rate of speed adopted for accommodation trains,	27 miles.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	27 miles.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	27 miles.	
103. Average rate of speed adopted for freight trains, including stops,	12 miles.	
104. Estimated weight in tons of passenger cars (not including passengers,) hauled one mile,	-	-
105. Estimated weight in tons of merchandise cars, (not including freight,) hauled one mile,	-	-

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, [inclusive of wooden bridges, and renewals of iron,]	\$241,346 26	
107. For repairs of wooden bridges,	-	-

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

108. For wages of switchmen, average per month,	\$44 00		
109. For wages of gate-keepers, average per month,			
110. For wages of signal-men, average per month,	39 00		
111. For wages of watchmen, average per month,	47 00		
112. Number of men employed, exclusive of those engaged in construction,		941	
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)		-	-
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,		-	-
115. Total for maintenance of way,		-	-
MOTIVE POWER AND CARS.			
116. For repairs of locomotives,	\$71,173 90		
117. For new locomotives, to cover depreciation,	-		-
118. For repairs of passenger cars,	43,996 63		
119. For new passenger cars, to cover depreciation,	-		-
120. For repairs of merchandise cars,	59,297 85		
121. For new merchandise cars, to cover depreciation,	-		-
122. For repairs of gravel and other cars,	-		-
123. Total for maintenance of motive power and cars,	-		-
124. Number of engines,	31		
125. Number of passenger cars,	33		
126. Number of baggage cars,	18		
127. Number of merchandise cars,	584		
128. Number of gravel cars,	9		
MISCELLANEOUS.*			
129. For fuel used by engines during the year, viz.:—			
1. Wood, number of cords, 1,163½. Cost of the same,	\$6,071 81		
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 11,754½. Cost of same, \$6.80,	79,930 60		
130. For oil used by cars and engines,	7,871 72		
131. For waste and other material for cleaning,	3,981 85		
132. For salaries, wages, and incidental expenses, chargeable to passenger department,	-		-
133. For salaries, wages, and incidental expenses, chargeable to freight department,	-		-
134. For gratuities and damages,	9,841 74		
135. For taxes and insurance,	128,238 26		
136. For ferries, [insurance,]	742 50		
137. For repairs of station buildings, aqueducts, fixtures, furniture,	51,463 03		
138. For renewals of iron, including laying down,	-		-
139. For new iron laid down, deducting the value of old iron taken up,	-		-
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	-		-
141. For amount paid other companies, as rent for use of their roads, specifying each company,	-		-
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,			Transportation and general expense account.

* See note on preceding page.

143. Total miscellaneous,	\$282,141 51
144. Total expenditures for working the road, [interest and taxes,]	\$1,055,267 90
145. Total amount of interest paid during the year, [Transportation and general expense account,]	33,694 20 322,617 55
INCOME DURING THE YEAR.*	
146. For Passengers :—	
1. On main road including branches owned by company,	\$817,780 20
2. To and from other roads, specifying what,	- -
147. For Freight :	
1. On main road and branches owned by company,	683,670 03
2. To and from other connecting roads,	- -
148. U. S. mails,	18,371 69
149. Rents, [and expresses,]	49,040 62
150. Total income,	\$1,568,861 94
151. Net earnings, after deducting expenses, [interest and taxes,]	513,594 04
DIVIDENDS.	
152. per cent. Total, [full and scrip stock,]	\$459,883 75
153. Surplus not divided,	- -
154. Surplus last year,	- -
155. Total surplus; cash and loans, ; stocks and bonds, real estate, ; fuel,	- -
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—	
156. Of road and bridges,	- -
157. Buildings,	- -
158. Engines and cars,	- -
MORTGAGE DEBTS.	
159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last Report,	\$927,000 00
160. Mortgage debt paid since last report,	135,000 00
161. Increase of mortgage debt since last report,	- -
162. Present amount of mortgage debts,	744,000 00
163. Number of mortgages, on road and franchise or any property of the Corporation,	One.

W. P. BURRALL,
CHAS. M. POND,
JULIUS CATLIN,
EDW. G. HOWE,
HENRY C. ROBINSON,

Directors of the Hartford and New Haven Railroad Corporation.

STATE OF CONNECTICUT.

HARTFORD COUNTY, ss. November 23, 1870. Then personally appeared W. P. Burrall, Chas. M. Pond, Julius Catlin, Edw. G. Howe and Henry C. Robinson, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

URIAH CASE, *Justice of the Peace.*

REPORT

OF THE

MONADNOCK RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized, [in Mass., (now merged in a N. H. Corp.,)]		\$50,000 00
2. Number of shares of capital stock issued, . . .	500	
3. Increase of capital since last report, . . .	None.	
4. Capital paid in, per last report, . . .	-	-
5. Capital paid in since last report, . . .	\$50,000 00	
6. Total amount of capital stock paid in, [in this State,]		50,000 00
7. Amount realized in cash value for stock issued, .	50,000 00	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report, . .	In process of construction.	
22. For graduation and masonry paid during the past year, . . .	\$19,820 00	\$19,820 00
23. Total am't expended for graduation and masonry, .		
24. For wooden bridges, per last report, . . .	None.	-
25. For wooden bridges, paid during the past year, .	-	-
26. Total amount expended for wooden bridges, . .	-	-
27. Total amount expended for iron bridges (if any,) .	-	-
28. For superstructure, including iron, per last report, .	None.	
29. For superstructure, including iron, paid during the past year, . . .	14,500 00	
30. Total amount expended for superstructure, including iron, . . .		14,500 00
31. For stations, buildings and fixtures, per last report, . . .	None.	
32. For stations, buildings and fixtures paid during the past year, . . .	None.	
33. Total amount expended for stations, buildings and fixtures, . . .	-	-
34. For land, land-damages and fences, per last report, .	None.	
35. For land, land-damages and fences paid during the past year, . . .	6,450 00	
36. Total amount expended for land, land-damages, and fences, . . .		6,450 00
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State, . . .	2 miles and 200 feet.	
57. Length of main road in other States, (specifying how much in each,) . . .	13½ miles in N. H.	
58. Length of single main track, . . .	2 miles and 200 feet.	
59. Length of double main track, . . .	None.	
60. Length of branches owned by the company, stating whether they have a single or double track, and specifying length in this State, and in each other State,) . . .	None.	

61. Aggregate length of sidings, and other tracks, excepting main track and branches,	None.
62. Length of roads belonging to other companies operated by this Company,	None.
63. Total miles of road operated by this Company, . .	None.
64. Weight of rail, per yard, in main road,	60 lbs.
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	None.
66. Maximum grade, with its length, in main road, . .	80 feet for 2,600 feet.
67. Maximum grade, with its length, in branch roads, . .	None.
68. Total rise and fall in main road,	57 feet.
69. Total rise and fall in branch roads,	None.
70. Shortest radius of curvature, with length of curve, in main road,	950 feet for 350 feet.
71. Shortest radius of curvature, with length of curve, in branch roads,	None.
72. Total degrees of curvature, in main road,	109°
73. Total degrees of curvature in branch roads,	None.
74. Total length of straight line in main road,	1½ miles.
75. Total length of straight line in branches,	None.

JONAS LIVINGSTON,
P. UPTON,
J. H. FAIRBANK,
H. A. BLOOD,
BAXTER D. WHITNEY,
O. H. BRADLEY,

Directors of the Monadnock Railroad Corporation.

STATE OF NEW HAMPSHIRE.

HILLSBOROUGH, ss. November 22, 1870. Then personally appeared Jonas Livingston, J. H. Fairbank, H. A. Blood, and Baxter D. Whitney, and Peter Upton, and Oscar H. Bradley, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

R. B. HATCH, *Justice of the Peace.*

R E P O R T

OF THE

STOCKBRIDGE & PITTSFIELD RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,		\$550,000 00
2. Number of shares of capital stock issued,	4,487	
3. Increase of capital since last report,	None.	
4. Capital paid in, per last report,	\$448,700 00	
5. Capital paid in since last report,	None.	
6. Total amount of capital stock paid in,		448,700 00
7. Amount realized in cash value for stock issued,	448,700 00	
8. Funded debt, per last report,	}	No funded or floating debt.
9. Funded debt paid since last report,		
10. Funded debt, increase of, since last report,		
11. Total present amount of funded debt,		
12. Floating debt, per last report,		
13. Floating debt paid since last report,	}	No funded or floating debt.
14. Floating debt, increase of, since last report,		
15. Total present amount of floating debt,		
16. Total present amount of funded and floating debt,		
17. Whole amount in cash value realized from funded and floating debts,		
18. Whole amount in cash value realized from stock and debts,	448,700 00	
19. Average rate of interest per annum paid during the year,	None.	
20. Maximum amount of debts during the year,	None.	
COST OF ROAD AND EQUIPMENT.		
21. For graduation and masonry, per last report,	\$154,263 00	
22. For graduation and masonry paid during the past year,	-	-
23. Total am't expended for graduation and masonry,		\$154,263 00
24. For wooden bridges, per last report,	8,489 00	
25. For wooden bridges paid during the past year,	-	-
26. Total amount expended for wooden bridges,		8,489 00
27. Total amount expended for iron bridges, (if any,)	-	-
28. For superstructure, including iron, per last report,	163,413 00	
29. For superstructure, including iron, paid during the past year,	-	-
30. Total amount expended for superstructure, including iron,		163,413 00
31. For stations, buildings and fixtures, per last report,	30,700 00	
32. For stations, buildings and fixtures paid during the past year,	-	-

33. Total amount expended for stations, buildings and fixtures,		\$80,700 00
34. For land, land-damages and fences, per last report,	\$70,000 00	
35. For land, land-damages and fences, paid during the past year,	-	-
36. Total amount expended for land, land-damages, and fences,		70,000 00
37. For locomotives, per last report,	-	-
38. For locomotives paid during the past year,	-	-
39. Total amount expended for locomotives,		-
40. For passenger and baggage cars, per last report,	4,100 00	
41. For passenger and baggage cars paid during the past year,	-	-
42. Total amount expended for passenger and baggage cars,		4,100 00
43. For merchandise cars, per last report,	-	-
44. For merchandise cars paid during the past year,	-	-
45. Total amount expended for merchandise cars,		-
46. For engineering, per last report,	8,000 00	
47. For engineering paid during the past year,	-	-
48. Total amount expended for engineering,		8,000 00
49. For agencies and other expenses, per last report,	-	-
50. For agencies and other expenses, paid during the past year,	-	-
51. Total amount expended for agencies and other expenses,		-
52. Amounts of discounts or other sacrifices on stock and bonds issued,	-	-
53. Total cost of road and equipment,		448,700 00
54. Amount of assets or property held by the corporation in addition to the cost of the road; cash and loans, ; stocks and bonds, ; real estate, fuel,	-	-
55. Income expended in construction and equipment,	-	-
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State,	21 93-100 miles.	
57. Length of main road in other States, (specifying how much in each,)	-	-
58. Length of single main track,	21 93-100 miles.	
59. Length of double main track,	-	-
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	-	-
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	5,700 feet.	
62. Length of roads belonging to other companies operated by this Company,	-	-
63. Total miles of road operated by this Company,		-
64. Weight of rail, per yard, in main road,	54, 56 and 60 lbs.	
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	-	-
66. Maximum grade, with its length, in main road,	42 ft.; length, 92-100.	
67. Maximum grade, with its length, in branch roads,	-	-
68. Total rise and fall in main road,	262 ft.; length, 858 ft.	
69. Total rise and fall in branch roads,	-	-
70. Shortest radius of curvature, with length of curve, in main road,	-	-
71. Shortest radius of curvature, with length of curve, in branch roads,	-	-
72. Total degrees of curvature in main road,	2,011°	

73. Total degrees of curvature in branch roads, . . .	-	-
74. Total length of straight line in main road, . . .	11 46-100 miles.	-
75. Total length of straight line in branches, . . .	-	-
76. Aggregate length of wooden truss bridges, . . .	932 feet.	-
77. Aggregate length of all other wooden bridges, . . .	20 feet.	-
78. Aggregate length of iron bridges, . . .	-	-
79. Whole length of road unfenced on both sides, . . .	-	-
80. Number of public ways crossed at grade, . . .	21	-
81. Number of railroads crossed at grade, . . .	-	-
82. Remarks, . . .	-	-
83. Way stations for express trains, . . .	9	-
84. Way stations for accommodation trains, . . .	-	-
85. Flag stations, . . .	1	-
86. Whole number of way stations, . . .	9	-
87. Whole number of flag stations, . . .	1	-

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains, . . .	27,108	
89. Miles run by freight trains, . . .	34,218	
90. Miles run by other trains, . . .	2,797	
91. Total miles run, . . .		64,123
92. Number of passengers carried in the cars, . . .	88,270	
93. Number of passengers carried one mile, . . .	867,290	
94. Number of tons of merchandise carried in the cars, . . .	47,472	
95. Number of tons of merchandise carried one mile, . . .	511,477	
96. Number of passengers carried one mile to and from other roads, . . .	463,230	
97. Number of tons carried one mile to and from other roads, . . .	311,417	
98. Rate of speed adopted for express passenger trains, including stops, . . .	No express trains.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions, . . .	-	-
100. Rate of speed adopted for accommodation trains, . . .	25 miles per hour.	-
101. Rate of speed actually attained by accommodation trains, including stops and detentions, . . .	20 miles per hour.	-
102. Average rate of speed actually attained by special trains, including stops and detentions, . . .	20 miles per hour.	-
103. Average rate of speed adopted for freight trains, including stops, . . .	9 miles per hour.	-
104. Estimated weight, in tons, of passenger cars (not including passengers) hauled one mile, . . .	-	-
105. Estimated weight, in tons, of merchandise cars, (not including freight) hauled one mile, . . .	-	-

EXPENDITURES FOR WORKING THE ROAD.*

106. For repairs of road, maintenance of way, exclusive of wooden bridges and renewals of iron, . . .	} See following page.
107. For repairs of wooden bridges, . . .	
108. For wages of switchmen, average per month, . . .	
109. For wages of gate-keepers, average per month, . . .	
110. For wages of signal-men, average per month, . . .	
111. For wages of watchmen, average per month, . . .	

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

112. Number of men employed, exclusive of those engaged in construction,
 113. For removing ice and snow (this item to include all labor, tools, repairs, and extra steam-power used,)
 114. For repairs of fences, gates, houses for signalmen, gate-keepers, switchmen, tool-houses,
 115. Total for maintenance of way,

MOTIVE POWER AND CARS.

116. For repairs of locomotives,
 117. For new locomotives, to cover depreciation,
 118. For repairs of passenger cars,
 119. For new passenger cars, to cover depreciation,
 120. For repairs of merchandise cars,
 121. For new merchandise cars, to cover depreciation,
 122. For repairs of gravel and other cars,
 123. Total for maintenance of motive power and cars,
 124. Number of engines,
 125. Number of passenger cars,
 126. Number of baggage cars,
 127. Number of merchandise cars,
 128. Number of gravel cars,

MISCELLANEOUS.*

129. For fuel used by engines during the year, viz. :—
 1. Wood, No. of cords, Cost of the same,
 2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) Cost of same,
 130. For oil used by cars and engines,
 131. For waste and other material for cleaning,
 132. For salaries, wages and incidental expenses, chargeable to passenger department,
 133. For salaries, wages and incidental expenses, chargeable to freight department,
 134. For gratuities and damages,
 135. For taxes and insurance,
 136. For ferries,
 137. For repairs of station buildings, aqueducts, fixtures, furniture,
 138. For renewals of iron, including laying down,
 139. For new iron laid down, deducting the value of old iron taken up,
 140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,
 141. For amount paid other companies as rent for use of their roads, specifying each company,
 142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,
 143. Total miscellaneous,
 144. Total expenditures for working the road,
 145. Total amount of interest paid during the year,

INCOME DURING THE YEAR.*

146. For Passengers :—
 1. On main road, including branches owned by company,
 2. To and from other roads, specifying what,

This road, as well as the Berkshire road, is managed exclusively by the Housatonic R. R. Co. While both roads are kept in perfect condition and repair, no separate account has ever been kept of the amount expended upon either, and it is impossible to answer the questions accurately, or in such a manner as to furnish any information to the legislature.

This road is managed by the Housatonic R. R. Co., and it is impossible to answer the questions.

* See note on preceding page.

147. For Freight:—		
1. On main road, and branches owned by Co.,	-	-
2. To and from other connecting roads, . . .	-	-
148. U. S. mails,	-	-
149. Rents,	\$31,409 00	
150. Total income,		\$31,409 00
151. Net earnings, after deducting expenses, . . .	31,409 00	
DIVIDENDS.		
152. 7 per cent. Total,		\$31,409 00
[Less taxes: Gov., \$1,295 76,]		
[State, 5,276 84,]		
[\$6,572 60,]		
153. Surplus not divided,	None.	
154. Surplus last year,	None.	
155. Total surplus; cash and loans, ;		
stocks and bonds, ; real estate,		
fuel,	None.	
ESTIMATED DEPRECIATION BEYOND THE RENEWALS,		
Viz.:—		
156. Of road and bridges,	-	-
157. Buildings,	-	-
158. Engines and cars,	-	-
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage, of road and franchise or any property of the Corporation, per last report,	} Nothing.	
160. Mortgage debt paid since last report,		
161. Increase of mortgage debt since last report,		
162. Present amount of mortgage debts,		
163. Number of mortgages, on road and franchise or any property of the Corporation,		

D. LEAVITT,
SAM'L WILLETS,
W. H. BARNUM,

Directors of the Housatonic Railroad Corporation.

BRIDGEPORT, Ct., ss. October 19, 1870. Then personally appeared D. Leavitt, Samuel Willets and W. H. Barnum, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

C. K. AVERILL, *Notary Public.*

REPORT

OF THE

BOSTON, HARTFORD & ERIE RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CHARACTERISTICS OF ROAD.	
56. Length of main road in this State,	112½ miles.
57. Length of main road in other States, (specifying how much in each,)	-
58. Length of single main track,	100 miles.
59. Length of double main track,	12½ miles.
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,)	50 miles, single, Mass.
61. Aggregate length of sidings, and other tracks, excepting main track and branches,	15 810-5,280 miles.
62. Length of roads belonging to other companies operated by this Company,	60 miles.
63. Total miles of road operated by this Company,	172½ miles.
64. Weight of rail, per yard, in main road,	56, 60, 63.
65. Weight of rail, per yard, in branch roads, (specify the different weights per yard,)	50, 56.
66. Maximum grade, with its length, in main road,	{ 59.66 ft. per mile; dis., 8,300 ft.
67. Maximum grade, with its length, in branch roads,	{ 66 ft. per mile; dis., 900 ft.
68. Total rise and fall in main road,	2,305.7 feet.
69. Total rise and fall in branch roads,	310 feet.
70. Shortest radius of curvature, with length of curve, in main road,	951 feet for 1,350 feet.
71. Shortest radius of curvature, with length of curve, in branch roads,	995 feet for 1,195 feet.
72. Total degrees of curvature in main road,	1,920° 52'
73. Total degrees of curvature in branch roads,	796° 15'
74. Total length of straight line in main road,	60.96
75. Total length of straight line in branches,	7.66
76. Aggregate length of wooden truss bridges,	3,720 feet.
77. Aggregate length of all other wooden bridges,	4,282 feet.
78. Aggregate length of iron bridges,	339 feet.
79. Whole length of road unfenced on both sides,	One mile.
80. Number of public ways crossed at grade,	130
81. Number of railroads crossed at grade,	Two in two places each.
82. Remarks,	-
83. Way stations for express trains,	6
84. Way stations for accommodation trains,	49
85. Flag stations,	16
86. Whole number of way stations,	65
87. Whole number of flag stations,	16

DOINGS DURING THE YEAR.* [10 MONTHS.]		
88. Miles run by passenger trains,	252,501	
89. Miles run by freight trains,	106,447	
90. Miles run by other trains,	37,608	
91. Total miles run,		396,556
92. Number of passengers carried in the cars,	1,184,360	
93. Number of passengers carried one mile,	11,603,008	
94. Number of tons of merchandise carried in the cars,	214,191	
95. Number of tons of merchandise carried one mile,	5,936,796	
96. Number of passengers carried one mile to and from other roads,	3,672,663	
97. Number of tons carried one mile to and from other roads,	5,853,763	
98. Rate of speed adopted for express passenger trains, including stops,	30 miles.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	35 miles.	
100. Rate of speed adopted for accommodation trains,	25 miles.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	30 miles.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	25 miles.	
103. Average rate of speed adopted for freight trains, including stops,	15 miles.	
104. Estimated weight, in tons, of passenger cars (not including passengers) hauled one mile,	12,904,693	
105. Estimated weight, in tons, of merchandise cars, (not including freight) hauled one mile,	9,173,309	
EXPENDITURES FOR WORKING THE ROAD.*		
[Maintenance of Way.]		
106. For repairs of road, maintenance of way, exclusive of wooden bridges and renewals of iron,	\$48,628 24	
107. For repairs of wooden bridges,	2,999 22	
108. For wages of switchmen, average per month, \$45 50	1,557 60	
109. For wages of gate-keepers, average per month, 30 00	4,057 39	
110. For wages of signal-men, average per month,	-	
111. For wages of watchmen, average per month, 60 00	3,478 65	
112. Number of men employed, exclusive of those engaged in construction,	511 men.	
113. For removing ice and snow (this item to include all labor, tools, repairs, and extra steam-power used,)	44 12	
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,	119 00	
115. Total for maintenance of way,	\$60,884 22	
MOTIVE POWER AND CARS.		
116. For repairs of locomotives,	\$7,341 36	
117. For new locomotives, to cover depreciation,	-	
118. For repairs of passenger cars,	5,086 64	

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

119. For new passenger cars, to cover depreciation,	\$2,809 79	
120. For repairs of merchandise cars,	2,685 23	
121. For new merchandise cars, to cover depreciation,	1,067 37	
122. For repairs of gravel and other cars,	-	-
123. Total for maintenance of motive power and cars,		\$18,980 39
124. Number of engines,	28	
125. Number of passenger cars,	36	
126. Number of baggage cars,	10	
127. Number of merchandise cars,	300	
128. Number of gravel cars,	119	
MISCELLANEOUS.*		
129. For fuel used by engines during the year, [10 mos.,] viz. :—		
1. Wood, No. of cords, 68½. Cost of the same,	\$707 70	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) 4,085 tons. Cost of same, . .	29,820 82	
130. For oil used by cars and engines,	1,924 72	
131. For waste and other material for cleaning, . .	452 85	
132. For salaries, wages and incidental expenses, chargeable to passenger department,	21,302 49	
133. For salaries, wages and incidental expenses, chargeable to freight department,	36,200 35	
134. For gratuities and damages,	746 67	
135. For taxes and insurance,	11,895 00	
136. For ferries,	-	-
137. For repairs of station buildings, aqueducts, fixtures, furniture,	2,982 10	
138. For renewals of iron, including laying down, . .	-	-
139. For new iron laid down, deducting the value of old iron taken up,	2,000 00	
140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	31,740 37	
141. For amount paid other companies as rent for use of their roads, specifying each company,	-	-
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	36,156 29	
143. Total miscellaneous, [chargeable to cost of road and equipment,]	103,990 29	
144. Total expenditures for working the road, . . .		\$279,919 65
145. Total amount of interest paid during the year,		359,784 26
		723 16
INCOME DURING THE YEAR.* [10 MONTHS.]		
146. For <i>Passengers</i> :—		
1. On main road, including branches owned by company,	\$201,740 27	
2. To and from other roads, specifying what, . .	-	-
147. For <i>Freight</i> :—		
1. On main road and branches owned by Co., . .	264,822 79	
2. To and from other connecting roads,	-	-
148. U. S. mails,	2,797 77	
149. Rents,	1,371 56	
150. Total income,		\$470,732 39
151. Net earnings, after deducting expenses, . . .	-	-

* See note on preceding page.

NOTE.—This Report is furnished at the request of the Receivers of the Corporation, and comprises all the information sought for which is in my possession.

WM. M. PARKER, *Gen'l Sup't.*

SUFFOLK, ss. December 6, 1870. Then personally appeared Wm. M. Parker, Gen'l Superintendent of Boston, Hartford and Erie Railroad, and made oath to the truth of the foregoing statement by him subscribed.

Witness my hand and official seal, at Boston, the day and year above written.

CHARLES P. CLARK, *Notary Public.*

REPORT

OF THE

NORWICH AND WORCESTER RAILROAD CORPORATION,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

1. Capital stock authorized,	\$2,825,000 00
2. Number of shares of capital stock issued,	23,644
3. Increase of capital since last report,	-
4. Capital paid in, per last report,	\$2,383,700 00
5. Capital paid in since last report,	700 00
6. Total amount of capital stock paid in,	2,384,400 00
7. Amount realized in cash value for stock issued,	1,748,230 32
8. Funded debt, per last report,	754,000 00
9. Funded debt paid since last report,	-
10. Funded debt, increase of, since last report,	22,000 00
11. Total present amount of funded debt, [See note at foot,*]	776,000 00
12. Floating debt, per last report,	49,919 63
13. Floating debt paid since last report,	35,035 31
14. Floating debt, increase of, since last report,	-
15. Total present amount of floating debt,	14,884 32
16. Total present amount of funded and floating debt,	790,884 32
17. Whole amount in cash value realized from funded and floating debts,	790,884 32
18. Whole amount in cash value realized from stock and debts,	2,552,149 95
19. Average rate of interest per annum paid during the year,	5½ per cent.
20. Maximum amount of debts during the year,	839,088 12
COST OF ROAD AND EQUIPMENT.	
21. For graduation and masonry, per last report,	\$614,529 92
22. For graduation and masonry paid during the past year,	-
23. Total am't expended for graduation and masonry,	\$614,529 92
24. For wooden bridges, per last report,	32,750 59
25. For wooden bridges paid during the past year,	-
26. Total amount expended for wooden bridges,	32,750 59
* State of Mass. (secured by bond and mortgage, and 4,000 shares stock; sinking fund, \$267,500),	
Bond and mortgage to secure bonds due June 1, 1874,	\$400,000 00
Bond and mortgage to secure bonds for machine shop, &c.,	59,000 00
Bond and mortgage to secure bonds for steamboat,	150,000 00
Bond and mortgage to secure bonds for steamboat,	17,000 00
Mortgage new wharf, notes payable,	125,000 00
Notes payable, secured by stock,	25,000 00
	\$776,000 00

27. Total amount expended for iron bridges, (if any.)	-	-
28. For superstructure, including iron, per last report,	\$357,181 48	
29. For superstructure, including iron, paid during the past year, .	-	-
30. Total amount expended for superstructure, including iron, .		\$357,181 48
31. For stations, buildings and fixtures, per last report,	49,168 93	
32. For stations, buildings and fixtures paid during the past year, .	-	-
33. Total amount expended for stations, buildings and fixtures, .		49,168 93
34. For land, land-damages and fences, per last report,	142,591 71	
35. For land, land-damages and fences paid during the past year, .	-	-
36. Total amount expended for land, land-damages, and fences, .		142,591 71
37. For locomotives, per last report, .	75,540 44	
38. For locomotives paid during the past year, .	-	-
39. Total amount expended for locomotives, .		75,540 44
40. For passenger and baggage cars, per last report, .	31,524 88	
41. For passenger and baggage cars paid during the past year, .	-	-
42. Total amount expended for passenger and baggage cars, .		31,524 88
43. For merchandise cars, per last report, .	42,646 25	
44. For merchandise cars paid during the past year, .	-	-
45. Total amount expended for merchandise cars, .		42,646 25
46. For engineering, per last report, .	69,449 50½	
47. For engineering paid during the past year, .	-	-
48. Total amount expended for engineering, .		69,499 50½
49. For agencies and other expenses, per last report, .	1,198,260 50½	
50. For agencies and other expenses, paid during the past year, .	-	-
51. Total amount expended for agencies and other expenses, .		1,198,260 50½
52. Amounts of discounts or other sacrifices on stock and bonds issued, .	-	-
53. Total cost of road and equipment, .		2,613,694 21
54. Amount of assets or property held by the corporation in addition to the cost of the road; cash and loans, \$138,310.93; stocks and bonds, \$596,117.10; real estate, \$271,437.99; fuel, [&c.,] \$57,686.84, .	1,063,552 86	
55. Income expended in construction and equipment,	314,422 40	
CHARACTERISTICS OF ROAD.		
56. Length of main road in this State, .	17 4-10 miles.	
57. Length of main road in other States, (specifying how much in each,) .	42½ miles.	
58. Length of single main track, .	59 4-10 miles.	
59. Length of double main track, .	-	-
60. Length of branches owned by the Company, (stating whether they have a single or double track, and specifying length in this State, and in each other State,) [Conn.,] .	7 miles, single.	
61. Aggregate length of sidings, and other tracks, excepting main track and branches, .	12¼ miles.	
62. Length of roads belonging to other companies operated by this Company, .	None.	
63. Total miles of road operated by this Company, .	66 4-10 miles.	
64. Weight of rail, per yard, in main road, .	56 and 60 lbs.	

65. Weight of rail, per yard, in branch roads (specify the different weights per yard,)	56 and 60 lbs.
66. Maximum grade, with its length, in main road,	32 ft. for 13,265 ft.
67. Maximum grade, with its length, in branch roads,	-
68. Total rise and fall in main road,	815½ feet.
69. Total rise and fall in branch roads,	-
70. Shortest radius of curvature, with length of curve, in main road,	500 ft. radius; 486 ft. long.
71. Shortest radius of curvature, with length of curve, in branch roads,	175 ft. radius, 200 ft. long.
72. Total degrees of curvature in main road,	426° 30'
73. Total degrees of curvature in branch roads,	-
74. Total length of straight line in main road,	33 miles.
75. Total length of straight line in branches,	1 6-10 miles.
76. Aggregate length of wooden truss bridges,	1,309 feet.
77. Aggregate length of all other wooden bridges,	528 feet.
78. Aggregate length of iron bridges,	None.
79. Whole length of road unfenced on both sides,	Fenced by abutters.
80. Number of public ways crossed at grade,	74
81. Number of railroads crossed at grade, [Boston and Albany, 1; B. H. & E., 2; H. P. & F. R. R., 1,]	4 (four.)
82. Remarks,	-
83. Way stations for express trains,	3
84. Way stations for accommodation trains,	18
85. Flag stations,	2
86. Whole number of way stations,	18
87. Whole number of flag stations,	2

DOINGS DURING THE YEAR.*

88. Miles run by passenger trains, [10 months,]	138,527	
89. Miles run by freight trains, [10 months,]	191,613	
90. Miles run by other trains, [10 months,]	19,818	
91. Total miles run, [10 months,]		349,958
[Miles run on N. Lon. N. road, 4,256; passengers, 1.]		
[12,003 freight included in amount above.]		
92. Number of passengers carried in the cars, [10 months,]	304,393	
93. Number of passengers carried one mile, [10 months,]	5,905,914	
94. Number of tons of merchandise carried in the cars, [10 months,]	225,535	
95. Number of tons of merchandise carried one mile, [10 months,]	9,312,721	
96. Number of passengers carried one mile, to and from other roads, [10 months,]	2,010,420	
97. Number of tons carried one mile, to and from other roads,	2,698,458	
98. Rate of speed adopted for express passenger trains, including stops,	30 miles per hour.	
99. Average rate of speed actually attained by express passenger trains, including stops and detentions,	30 miles per hour.	
100. Rate of speed adopted for accommodation trains,	20 miles per hour.	
101. Rate of speed actually attained by accommodation trains, including stops and detentions,	30 miles per hour.	
102. Average rate of speed actually attained by special trains, including stops and detentions,	-	-
103. Average rate of speed adopted for freight trains, including stops,	12 miles per hour.	

* All items under the headings marked with an asterisk, are required by law for "the total miles of road operated by this company."

104. Estimated weight, in tons, of passenger cars, (not including passengers,) hauled one mile, . . .	7,129,231	
105. Estimated weight, in tons, of merchandise cars, (not including freight,) hauled one mile, . . .	15,670 002	
EXPENDITURES FOR WORKING THE ROAD.*		
106. For repairs of road, maintenance of way, exclusive of wooden bridges, and renewals of iron, . .	\$71,386 90	
107. For repairs of wooden bridges,	993 47	
108. For wages of switchmen, average per month,	\$238 91	Total,
109. For wages of gate-keepers, average per month,	17 00	
110. For wages of signal-men, average per month,	212 51	
111. For wages of watchmen, average per month,	329 50	
112. Number of men employed, exclusive of those engaged in construction,	381	
113. For removing ice and snow, (this item to include all labor, tools, repairs, and extra steam-power used,)	277 08	
114. For repairs of fences, gates, houses for signal-men, gate-keepers, switchmen, tool-houses,	106 45	
115. Total for maintenance of way,	\$82,635 39	
MOTIVE POWER AND CARS.		
116. For repairs of locomotives,	\$23,859 90	
117. For new locomotives, to cover depreciation, . .	-	
118. For repairs of passenger cars,	6,273 31	
119. For new passenger cars, to cover depreciation, .	-	
120. For repairs of merchandise cars,	23,430 09	
121. For new merchandise cars, to cover depreciation, .	38,634 09	
122. For repairs of gravel and other cars,	1,562 34	
123. Total for maintenance of motive power and cars, .	\$93,759 73	
124. Number of engines,	21	
125. Number of passenger cars,	20	
126. Number of baggage cars,	-	
127. Number of merchandise cars,	642	
128. Number of gravel cars,	-	
MISCELLANEOUS.*		
129. For fuel used by engines during the year, viz.:—		
1. Wood, No. of cords, Cost of the same,	\$24,106 66	
2. Coal, number of tons, (reckoning 2,240 lbs. to the ton,) Cost of same,	33,821 46	
130. For oil used by cars and engines,	4,844 45	
131. For waste and other material for cleaning, . . .	1,109 87	
132. For salaries, wages and incidental expenses, chargeable to passenger department,	31,847 85	
133. For salaries, wages and incidental expenses, chargeable to freight department,	74,207 87	
134. For gratuities and damages,	2,328 27	
135. For taxes and insurance,	87,621 56	
136. For ferries,	-	
137. For repairs of station buildings, aqueducts, fixtures, furniture,	2,516 35	
138. For renewals of iron, including laying down, . .	-	
139. For new iron laid down, deducting the value of old iron taken up,	-	

* See note on preceding page.

140. For amount paid other companies, in tolls for passengers and freight carried on their roads, specifying each company,	-	-
141. For amount paid other companies, as rent for use of their roads, specifying each company,	-	-
142. For salaries of president, treasurer, superintendent, law expenses, office expenses of the above offices, and all other expenses not included in any of the foregoing items,	\$33,757 96	
143. Total miscellaneous,		\$246,162 30
144. Total expenditures for working the road,		422,557 42
145. Total amount of interest paid during the year, [Total expenses and interest,]		43,087 32
		465,644 74
INCOME DURING THE YEAR.*		
146. For Passengers :—		
1. On main road, including branches owned by company,	\$138,295 45	\$208,552 79
2. To and from other roads specifying what, [B. & A., W. & N., B. H. & E., and H. P. & F.,]	70,257 34	
147. For Freight :—		
1. On main road and branches owned by company,	208,073 71	369,553 07
2. To and from other connecting roads, [B. & A., W. & N., B. H. & E., and H. P. & F.,]	161,479 36	
148. U. S. mails,	1,000 00	36,093 68
149. Rents, [\$770.82; other income, \$34,322.86, for express service,]	35,093 68	
150. Total income,		614,199 54
151. Net earnings, after deducting expenses, [and interest,]	148,554 80	
DIVIDENDS.		
152. 10 per cent. Total,		\$244,693 57
153. Surplus not divided,	\$241,539 45	
154. Surplus last year, [and other items,]	230,171 03	
155. Total surplus; [or balance profit and loss account,] cash and loans,		227,016 91
bonds, ; real estate,		
fuel,		
ESTIMATED DEPRECIATION BEYOND THE RENEWALS, VIZ. :—		
156. Of road and bridges,	-	-
157. Buildings,	-	-
158. Engines and cars,	-	-
MORTGAGE DEBTS.		
159. Amount of debts secured by mortgage of road and franchise, or any property of the Corporation, per last Report,	\$609,000 00	
160. Mortgage debt paid since last Report,	-	-
161. Increase of mortgage debt since last Report, [or addition,]	142,000 00	
162. Present amount of mortgage debts,	751,000 00	
163. Number of mortgages on road and franchise, or any property of the Corporation,	Five.	

A. F. SMITH, *President*,
A. BREWSTER,
G. L. PERKINS, *Treas.*,
P. ST. M. ANDREWS, *Sup't*,

Directors of the Norwich and Worcester Railroad Corporation.

STATE OF CONNECTICUT.

NEW LONDON Co., ss. December 6, 1870. Then personally appeared A. F. Smith, Pres., A. Brewster, a Director, and G. L. Perkins, Treas'r, and P. St. M. Andrews, Sup't Nor. and Wor. R. R., and severally made oath to the truth of the foregoing statement by them subscribed.

Before me,

GEO. C. RIPLEY, *Justice of the Peace.*

HORSE RAILROAD REPORTS,

FOR THE TEN MONTHS ENDING

September 30, 1870.

R E P O R T

OF THE

ALBANY STREET FREIGHT RAILWAY COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter,		\$75,000 00
2. Capital stock, as voted by the company,	\$75,000 00	
3. Capital stock paid in, expressed in money,	75,000 00	
4. Funded debt,	None.	
5. Floating debt, including amount of unredeemed tickets,	1,136 41	
6. Total debt,		1,136 41
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	None.	
8. Number of mortgages on any other property of the corporation, specifying the amounts,	None.	
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	29,054 43	
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$47,252 88	
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	4,650 feet.	
12. Length of railway laid with double main track,	400 feet.	
13. Length of branches owned by the company, stating amount of double track, if any,	None.	
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	448 feet.	
15. Total length of track measured as single track,	5,498 feet.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	} 90 lbs., wrought iron, except 293 feet, flat and grooved on curves.	
17. Maximum grade per mile, with length of grade,		Level.
18. Shortest radius of curvature, with length of curve,		67 radius; 66 ft. long.
19. Total length of track paved,		5,498 feet.

COST OF EQUIPMENT.

20. Number of cars, and cost,	None.
21. Number of horses, and cost,	None.
22. Cost of omnibuses, sleighs and other vehicles, excepting cars, owned by the company,	None.
23. Cost of real estate, including buildings owned by the company,	—
24. Cost of buildings owned by the company, on land not owned by the company,	\$294 89
25. Cost of other articles of equipment,	217 08
26. Net amount at which the equipment stands charged on the books of the company,	511 97

DOINGS DURING THE YEAR.

27. Total number of miles run during the year,	} Applicable to passenger railways.	
28. Average cost per mile run,		
29. Total number of passengers carried in the cars,		
30. Total number of round trips run during the year,		
31. Average number of passengers each round trip		
32. Rate of speed adopted, including stops and detentions,		
33. Number of persons regularly employed, specifying the occupations of each, [President, treasurer, clerk, superintendent, switchman.]	5	

EXPENDITURES FOR WORKING THE RAILWAY.

34. For repairs of railway,	\$1 00	
35. For repairs of equipments,	6 00	
36. For repairs of real estate,	None.	
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent and treasurer,	474 00	
38. For interest,	12 61	
39. For taxes and insurance, other than United States taxes,	None.	
40. For United States taxes,	None.	
41. For rent and tolls paid other companies for use of their roads,	None.	
42. Amount paid other companies for the use of bridges and ferries,	None.	
43. For provender,	None.	
44. For loss on horses,	None.	
45. For incidental expenses,—to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	1,603 53	
46. Total expenses,		\$2,097 14

EARNINGS.

47. Received from passengers in cars and omnibuses, and for tickets sold,	None.	
48. From other roads, as toll or rent for use of road,	None.	
49. From other sources, specifying from what source in each item exceeding five hundred dollars, [freights,]	\$2,654 00	
50. Total earnings,		\$2,654 00
51. Net earnings, after deducting expenses,	556 86	
52. Surplus earnings of previous year on hand,	126 01	
53. Total surplus,		682 87
54. Dividends declared during the year,	None.	
55. Total percentage of dividends for the year,	None.	
56. Present surplus,	682 87	

MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter,		None.
58. Increase during the year of capital stock paid in,		None.
59. Increase of funded debt during the year,		None.
60. Increase of floating debt during the year,		None.
61. Decrease of funded debt during the year,		None.
62. Decrease of floating debt during the year,		\$3,240 77
63. Increase of mortgage debt during the year,		None.
64. Decrease of mortgage debt during the year,		None.
65. Increase in cost of road during the year,		397 56
66. Decrease in nominal cost of road,		None.
67. Increase in cost of equipment during the year,		14 12
68. Decrease in cost of equipment during the year,		None.
69. Increase of unredeemed tickets during the year,		None.
70. Decrease of unredeemed tickets during the year,		None.
71. Present amount of unredeemed tickets,		None.
72. List of accidents on road during the year,		None.

JARVIS WILLIAMS,
CHAS. JARVIS WILLIAMS,
RUEL WILLIAMS,
ADAMS AYER,
Directors of the Albany Street Freight Railway Company.

SUFFOLK, ss. October 27, 1870. Then personally appeared Jarvis Williams, C. J. Williams, Ruel Williams, Adams Ayer, and severally made oath to the truth of the foregoing statement by them subscribed.

BeforeCHAS. F. THAYER, *Justice of the Peace.*

R E P O R T
OF THE
BOSTON AND CHELSEA RAILWAY COMPANY,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.	
1. Capital stock, fixed by charter,	\$300,000 00
2. Capital stock, as voted by the company,	\$110,000 00
3. Capital stock paid in, expressed in money,	110,000 00
4. Funded debt,	} None.
5. Floating debt, including amount of unredeemed tickets,	
6. Total debt,	
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	
8. Number of mortgages on any other property of the corporation, specifying the amounts,	}
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	
	8,087 00
COST OF THE RAILWAY.	
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$110,000 00
CHARACTERISTICS OF THE RAILWAY.	
11. Length of railway laid with single main track,	5,189 feet.
12. Length of railway laid with double main track,	6,302 feet.
13. Length of branches owned by the company, stating amount of double track, if any,	None.
14. Aggregate length of switches, sidings, turnouts and other track, excepting main track and branches,	862 feet.
15. Total length of track measured as single track,	18,655 ft.
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	56 lbs., rolled iron.
17. Maximum grade per mile, with length of grade,	148.8 feet; 240 feet.
18. Shortest radius of curvature, with length of curve,	200 ft. ; length, 177 ft.
19. Total length of track paved,	{ All paved except Chelsea Bridge.

COST OF EQUIPMENT.	
20. Number of cars, and cost,	} The Company own no equipment. That used is owned and furnished by the Lynn and Boston Railroad Co.
21. Number of horses, and cost,	
22. Cost of omnibuses, sleighs, and other vehicles, excepting cars, owned by the company,	
23. Cost of real estate, including buildings owned by the company,	
24. Cost of buildings owned by the company, on land not owned by the company,	
25. Cost of other articles of equipment,	
26. Net amount at which the equipment stands charged on the books of the company,	

DOINGS DURING THE YEAR. [10 MONTHS.]	
27. Total number of miles run during the year,	} Reported by Lynn and Boston Railroad Co.
28. Average cost per mile run,	
29. Total number of passengers carried in the cars,	
30. Total number of round trips run during the year,	
31. Average number of passengers each round trip,	
32. Rate of speed adopted, including stops and de- tentions,	
33. Number of persons regularly employed, specify- ing the occupations of each,	

EXPENDITURES FOR WORKING THE RAILWAY.	
34. For repairs of railway,	} Reported as above.
35. For repairs of equipments,	
36. For repairs of real estate,	
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,	
38. For interest,	- -
39. For taxes and insurance, other than United States taxes,	- -
40. For United States taxes,	\$376 08
41. For rent and tolls paid other companies for use of their roads,	} Reported as above.
42. Amount paid other companies for the use of bridges and ferries,	
43. For provender,	
44. For loss on horses,	
45. For incidental expenses, — to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	
46. Total expenses,	20 00 \$396 08

EARNINGS.	
47. Received from passengers in cars and omnibuses, and for tickets sold,	} Received by Lynn and Boston R. R.
48. From other roads, as toll or rent for use of road,	
49. From other sources, specifying from what source in each item exceeding five hundred dollars,	\$4,400 00
50. Total earnings,	- - \$4,400 00
51. Net earnings, after deducting expenses,	4,003 92
52. Surplus earnings of previous year on hand,	256 95
53. Total surplus,	80 87
54. Dividends declared during the year,	One.
55. Total percentage of dividends for the year,	4 per cent., (less U. S. tax.)
56. Present surplus,	80 87

MISCELLANEOUS.	
67. Increase during the year of capital stock, as fixed by charter,	} Nothing.
68. Increase during the year of capital stock paid in, .	
69. Increase of funded debt during the year,	
60. Increase of floating debt during the year,	
61. Decrease of funded debt during the year,	
62. Decrease of floating debt during the year,	
63. Increase of mortgage debt during the year,	
64. Decrease of mortgage debt during the year,	
65. Increase in cost of road during the year,	
66. Decrease in nominal cost of road,	
67. Increase in cost of equipment during the year, .	
68. Decrease in cost of equipment during the year, .	
69. Increase of unredeemed tickets during the year, .	}
70. Decrease of unredeemed tickets during the year, .	
71. Present amount of unredeemed tickets,	
72. List of accidents on road during the year,	

WM. W. WHEILDON,
J. H. CONVERSE,
R. E. DEMMON,
T. QUINCY BROWNE,
Directors of the Boston and Chelsea Railway Company.

Boston, Suffolk, ss. November 10, 1870. Then personally appeared Wm. W. Wheildon, J. H. Converse and R. E. Demmon ; and December 11th personally appeared T. Quincy Browne, and severally made oath to the truth of the foregoing statement by them subscribed.

Before
A. W. ADAMS, *Justice of the Peace.*

REPORT
OF THE
CAMBRIDGE RAILWAY COMPANY,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter,	\$750,000 00	
2. Capital stock, as voted by the company,	\$727,800 00	
3. Capital stock paid in, expressed in money,	727,800 00	
4. Funded debt,	150,000 00	
5. Floating debt, including amount of unredeemed tickets,	73 90	
6. Total debt,	150,073 90	
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	One on a part of the road to secure \$150,000 of the funded debt, as above.	
8. Number of mortgages on any other property of the corporation, specifying the amounts,		
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,		
Reference is made to the Report of the Union Railway Company.		
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$734,670 92	
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	67,679 feet.	
12. Length of railway laid with double main track,	22,828 feet.	
13. Length of branches owned by the company, stating amount of double track, if any,	31,511 feet.	
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	4,646 feet.	
15. Total length of track, measured as single track,	28 miles and 1,652 feet.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	33 to 64 lbs.	
17. Maximum grade per mile, with length of grade,	{ 209 11-21 feet per mile; 630 feet in length.	
18. Shortest radius of curvature, with length of curve,	28 ft. ; 30 ft. in length.	
19. Total length of track paved,	All the main track is paved.	

COST OF EQUIPMENT.

- 20. Number of cars and cost,
- 21. Number of horses and cost,
- 22. Cost of omnibuses, sleighs, and other vehicles, excepting cars, owned by the company,
- 23. Cost of real estate, including buildings owned by the company,
- 24. Cost of buildings owned by the company, on land not owned by the company,
- 25. Cost of other articles of equipment,
- 26. Net amount at which the equipment stands charged on the books of the company,

DOINGS DURING THE YEAR.

- 27. Total number of miles run during the year,
- 28. Average cost per mile run,
- 29. Total number of passengers carried in the cars,
- 30. Total number of round trips run during the year,
- 31. Average number of passengers each round trip,
- 32. Rate of speed adopted, including stops and detentions,
- 33. Number of persons regularly employed, (specifying the occupations of each,)

EXPENDITURES FOR WORKING THE RAILWAY.

- 34. For repairs of railway,
- 35. For repairs of equipments,
- 36. For repairs of real estate,
- 37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,
- 38. For interest,
- 39. For taxes and insurance, other than United States taxes,
- 40. For United States taxes,
- 41. For rent and tolls paid other companies for use of their roads,
- 42. Amount paid other companies for the use of bridges and ferries,
- 43. For provender,
- 44. For loss on horses,
- 45. For incidental expenses, — to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,
- 46. Total expenses,

EARNINGS.

- 47. Received from passengers in cars and omnibuses, and for tickets sold,
- 48. From other roads, as toll or rent for use of road,
- 49. From other sources, specifying from what source in each item, exceeding five hundred dollars,
- 50. Total earnings,
- 51. Net earnings, after deducting expenses,
- 52. Surplus earnings of previous year on hand,
- 53. Total surplus,
- 54. Dividends declared during the year,
- 55. Total percentage of dividends for the year,
- 56. Present surplus,

Reference is made to the
Report of the Union
Railway Co.

Nine per cent. on the
amount of the capital,
interest on the bonds,
and two per cent. on the
bonds for a sinking fund,
from which is deducted
the United States and
State taxes.

MISCELLANEOUS.	
57. Increase during the year of capital stock, as fixed by charter, . . .	} Nothing.
58. Increase during the year of capital stock paid in, . . .	
59. Increase of funded debt during the year, . . .	
60. Increase of floating debt during the year, . . .	
61. Decrease of funded debt during the year, . . .	
62. Decrease of floating debt during the year, . . .	} Reference is made to the Report of the Union Railway Co.
63. Increase of mortgage debt during the year, . . .	
64. Decrease of mortgage debt during the year, . . .	
65. Increase in cost of road during the year, . . .	
66. Decrease in nominal cost of road, . . .	
67. Increase in cost of equipment during the year, . . .	
68. Decrease in cost of equipment during the year, . . .	
69. Increase of unredeemed tickets during the year, . . .	
70. Decrease of unredeemed tickets during the year, . . .	
71. Present amount of unredeemed tickets, . . .	
72. List of accidents on road during the year, . . .	

N. B.—Owing to the change in the time of making the annual report, this report covers the time from December 1, 1869, to September 30, 1870, both inclusive.

R. E. DEMMON,
W. A. SAUNDERS,
C. C. ALLEN,
ESTES HOWE,
Directors of the Cambridge Railway Company.

MIDDLESEX, ss. November 1, 1870. Then personally appeared R. E. Demmon, W. A. Saunders, C. C. Allen and Estes Howe, and severally made oath to the truth of the foregoing statement by them subscribed.
Before FREDERICK T. STEVENS, *Justice of the Peace.*

REPORT

OF THE

LOWELL HORSE RAILROAD COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.	
1. Capital stock, fixed by charter,	\$100,000 00
2. Capital stock, as voted by the company,	\$100,000 00
3. Capital stock paid in, expressed in money,	55,830 00
4. Funded debt,	None.
5. Floating debt, including amount of unredeemed tickets,	None.
6. Total debt,	None.
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	None.
8. Number of mortgages on any other property of the corporation, specifying the amounts,	None.
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	None.
COST OF THE RAILWAY.	
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$49,179 99
CHARACTERISTICS OF THE RAILWAY.	
11. Length of railway laid with single main track,	20,143 ft.
12. Length of railway laid with double main track,	None.
13. Length of branches owned by the company, stating amount of double track, if any,	None.
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	1,143 ft.
15. Total length of track, measured as single track,	21,286 ft.
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	} Rolled iron ; 4,036 ft. at 33 lbs. per yard ; the rest 28½ lbs.
17. Maximum grade per mile, with length of grade,	
18. Shortest radius of curvature, with length of curve,	368½ ft. for 248 ft. length. 40 ft. radius for 72 ft. length.
19. Total length of track paved,	{ 15,037 full paved ; balance side paved.

COST OF EQUIPMENT.

20. Number of cars, and cost, [9]	\$9,772 89
21. Number of horses, and cost, [50]	8,002 80
22. Cost of omnibuses, sleighs and other vehicles, excepting cars, owned by the company,	1,263 95
23. Cost of real estate, including buildings owned by the company,	None.
24. Cost of buildings owned by the company, on land not owned by the company,	None.
25. Cost of other articles of equipment,	1,780 37
26. Net amount at which the equipment stands charged on the books of the company,	20,820 01

DOINGS DURING THE YEAR.

27. Total number of miles run during the year,	103,262
28. Average cost per mile run,	23 cents (nearly.)
29. Total number of passengers carried in the cars,	443,677
30. Total number of round trips run during the year,	13,486
31. Average number of passengers each round trip,	33 (nearly.)
32. Rate of speed adopted, including stops and detentions,	5 miles per hour.
33. Number of persons regularly employed, specifying the occupations of each, [Treasurer, superintendent, repairer, watchman, 4 stable hands, 8 conductors, 9 drivers.]	25

EXPENDITURES FOR WORKING THE RAILWAY.

34. For repairs of railway,	\$325 27
35. For repairs of equipments,	1,400 74
36. For repairs of real estate,	None.
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,	7,943 93
38. For interest,	Nothing.
39. For taxes and insurance, other than U. S. taxes,	907 29
40. For United States taxes,	623 02
41. For rent and tolls paid other companies for use of their roads,	Nothing.
42. Amount paid other companies for the use of bridges and ferries,	Nothing.
43. For provender,	6,914 94
44. For loss on horses, [depreciation,]	891 40
45. For incidental expenses,—to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	4,243 61
46. Total expenses,	\$23,750 20

EARNINGS.

47. Received from passengers in cars and omnibuses, and for tickets sold,	\$25,613 83
48. From other roads, as toll or rent for use of road,	Nothing.
49. From other sources, specifying from what source in each item exceeding five hundred dollars,	567 00
50. Total earnings,	\$26,180 83
51. Net earnings, after deducting expenses,	2,430 63
52. Surplus earnings of previous year on hand,	1,321 81
53. Total surplus,	3,752 44
54. Dividends declared during the year,	None.
55. Total percentage of dividends for the year,	None.
56. Present surplus,	3,752 44

MISCELLANEOUS.	
57. Increase during the year of capital stock, as fixed by charter, . . .	Nothing.
58. Increase during the year of capital stock paid in, . . .	Nothing.
59. Increase of funded debt during the year, . . .	Nothing.
60. Increase of floating debt during the year, . . .	Nothing.
61. Decrease of funded debt during the year, . . .	Nothing.
62. Decrease of floating debt during the year, . . .	Nothing.
63. Increase of mortgage debt during the year, . . .	Nothing.
64. Decrease of mortgage debt during the year, . . .	Nothing.
65. Increase in cost of road during the year, . . .	Nothing.
66. Decrease in nominal cost of road, . . .	Nothing.
67. Increase in cost of equipment during the year, . . .	Nothing.
68. Decrease in cost of equipment during the year, . . .	Nothing.
69. Increase of unredeemed tickets during the year, . . .	} Supposed to be balanced by tickets sold by agents, and not yet accounted for.
70. Decrease of unredeemed tickets during the year, . . .	
71. Present amount of unredeemed tickets, . . .	
72. List of accidents on road during the year, . . .	1

ACCIDENT.

About June 10th, a woman jumped from a car while it was in motion, and was badly bruised.

WM. E. LIVINGSTON,
ALBERT WHEELER,
ROB'T WOOD,
JOHN A. GOODWIN,

Majority of the Directors of the Lowell Horse Railroad Company.

MIDDLESEX, ss. November 12, 1870. Then personally appeared William E. Livingston, Robert Wood, Albert Wheeler and John A. Goodwin, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

GEORGE W. COBURN, *Justice of the Peace.*

REPORT

OF THE

LYNN AND BOSTON RAILWAY COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter,		\$200,000 00
2. Capital stock, as voted by the company,	\$200,000 00	
3. Capital stock paid in, expressed in money,	200,000 00	
4. Funded debt, [bonds,]	50,000 00	
[See Sinking Fund, in No. 9, paid on this.]		
5. Floating debt, including amount of unredeemed tickets,	51,137 30	
6. Total debt,		101,137 30
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	} One for \$50,000, to cover bonds.	
8. Number of mortgages on any other property of the corporation, specifying the amounts,	{ One for \$10,000 on real estate; one for \$10,350 on personal estate; and upon the equity of above mortgage on real estate.	
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair, [includes a sinking fund of \$9,500. See No. 4.]		\$23,922 50 .
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,		\$170,832 68
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	About 10¾ miles.	
12. Length of railway laid with double main track,	— —	
13. Length of branches owned by the company, stating amount of double track, if any,	One mile, single track.	
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	About 4,600 feet.	
15. Total length of track measured as single track,	About 12½ miles.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	{ Rolled iron; one-quarter 45 lbs. per yard, and three-quarters 25 lbs. per yard.	
17. Maximum grade per mile, with length of grade,	— —	

18. Shortest radius of curvature, with length of curve,	40 ft. radius; 65 ft. long.
19. Total length of track paved,	About 11,000 feet.
COST OF EQUIPMENT.	
20. Number of cars and cost,	\$30,300 00
21. Number of horses and cost,	32,265 00
22. Cost of omnibuses, sleighs and other vehicles, excepting cars, owned by the company,	5,530 00
23. Cost of real estate, including buildings owned by the company,	25,780 00
24. Cost of buildings owned by the company, on land not owned by the company,	230 00
25. Cost of other articles of equipment,	11,283 48
26. Net amount at which the equipment stands charged on the books of the company,	105,388 48
DOINGS DURING THE YEAR. [10 Mos.]	
27. Total number of miles run during the year, [10 mos.,]	402,838
28. Average cost per mile run,	35 50-100 cents.
29. Total number of passengers carried in the cars,	1,647,887
30. Total number of round trips run during the year, [10 mos.,]	32,769
31. Average number of passengers each round trip,	50 30-100
32. Rate of speed adopted, including stops and detentions,	6 miles per hour
33. Number of persons regularly employed, specifying the occupations of each,	110
[Treasurer, superintendent, 1 clerk, 2 receivers, 3 foremen at stables, 24 conductors, 24 drivers, 16 hostlers, 1 harness cleaner, 3 feeders, 4 watchmen, 1 harness-maker, 2 harnessers, 4 wood-workers, 2 painters, 7 blacksmiths, 15 trackmen.]	
EXPENDITURES FOR WORKING THE RAILWAY.	
34. For repairs of railway,	\$12,452 14
35. For repairs of equipments,	16,522 10
36. For repairs of real estate,	917 72
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,	41,659 11
38. For interest,	4,888 78
39. For taxes and insurance, other than United States taxes,	1,496 17
40. For United States taxes,	8,690 61
41. For rent and tolls paid other companies for use of their roads,	15,678 51
42. Amount paid other companies for the use of bridges and ferries,	
43. For provender,	81,965 48
44. For loss on horses,	6,647 00
45. For incidental expenses,—to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	7,115 92
46. Total expenses,	\$143,033 54
EARNINGS.	
47. Received from passengers in cars and omnibuses, and for tickets sold, [and redeemed,]	\$135,287 95
48. From other roads, as toll or rent for use of road,	-

49. From other sources, specifying from what source in each item exceeding five hundred dollars, [sales manure, \$1,380.81 ; sundries, \$50,]	\$1,430 81	
50. Total earnings,		\$136,718 76
51. Net earnings, after deducting expenses,	-	-
52. Surplus earnings of previous year on hand,	5,821 46	
53. Total surplus,	-	-
54. Dividends declared during the year,	} None.	
55. Total percentage of dividends for the year,		
56. Present surplus,		
MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter,	} Nothing.	
58. Increase during the year of capital stock paid in,		
59. Increase of funded debt during the year,		
60. Increase of floating debt during the year, [10 mos.,]	\$9,185 10	
61. Decrease of funded debt during the year, [10 mos.,]	1,000 00	
62. Decrease of floating debt during the year, [10 mos.,]	Nothing.	
63. Increase of mortgage debt during the year, [10 mos.,]	Nothing.	
64. Decrease of mortgage debt during the year, [10 mos.,]	Nothing.	
65. Increase in cost of road during the year, [10 mos.,]	} Nothing.	
66. Decrease in nominal cost of road,		
67. Increase in cost of equipment during the year, [10 mos.,]	1,890 00	
68. Decrease in cost of equipment during the year, [10 mos.,]	-	-
69. Increase of unredeemed tickets during the year, [10 mos.,]	251 90	
70. Decrease of unredeemed tickets during the year, [10 mos.,]	-	-
71. Present amount of unredeemed tickets,	2,429 52	
72. List of accidents on road during the year,	-	-

ACCIDENTS.

January 1, 1870.—A boy running in the street by the side of a car, was knocked down by a heavy team and his leg badly injured, either by the car or team.

January 22.—A man named Henry Kelley, while under the influence of liquor, in attempting to rise from the steps of the front platform of a car, where he had been sitting unknown to the conductor, on a late night trip, fell to the ground and was run over by the car and killed.

March 17.—An intoxicated man, who was sitting on the front platform of a car, was knocked off by a passing sled, and the man's leg bruised by the wheel of the car.

May 15.—A passenger fell from the front steps of a car in Lynn, and the car badly injured his arm and shoulder.

June 1.—An intoxicated man, standing in Haymarket Square, Boston, fell against a passing car and cut his head.

June 8.—A lady, in attempting to leave a car in Lynn, fell, and was slightly hurt.

July 5.—Young lady jumped off the rear platform of a car in Lynn, and hurt her head slightly.

August 1.—A man who had a large dog tied by a chain, attempted to leave the front platform of a car before it had stopped ; in so doing was pulled to the ground by the dog, and one wheel of the car passed over his foot.

BENJ'N P. WINSLOW,
A. A. BREED,
E. F. OLIVER,
THOS. P. PROCTOR,
BENJAMIN H. DEWING,
JOHN REED,

Directors of the Lynn and Boston Railway Company.

SUFFOLK, ss. November 1, 1870. Then personally appeared Benj. P. Winslow, A. A. Breed, E. F. Oliver, Thos. P. Proctor, Benjamin H. Dewing, and severally made oath to the truth of the foregoing statement by them subscribed.

Before

A. J. ROBINSON, *Justice of the Peace.*

SUFFOLK, ss. November 2, 1870. Then personally appeared John Reed, and made oath of the truth of the foregoing statement by him subscribed.

Before

G. S. HILLARD, *Justice of the Peace.*

R E P O R T

OF THE

MALDEN AND MELROSE RAILROAD COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.*		
1. Capital stock, fixed by charter,		\$200,000 00
2. Capital stock, as voted by the company,	\$200,000 00	
3. Capital stock paid in, expressed in money,	-	-
4. Funded debt,	45,872 85	.
5. Floating debt, including amount of unredeemed tickets,	-	-
6. Total debt,	-	-
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	2—15,000 and 60,000.	
8. Number of mortgages on any other property of the corporation, specifying the amounts,	-	-
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	Nothing.	
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,		\$60,246 48
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	18,006 feet.	
12. Length of railway laid with double main track,	None.	
13. Length of branches owned by the company, stating amount of double track, if any,	None.	
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	1,000 feet.	
15. Total length of track measured as single track,	19,006 feet.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	{ Rolled iron, 33 lbs., 45 lbs., and 55 lbs.	
17. Maximum grade per mile, with length of grade,	264 feet per mile.	
18. Shortest radius of curvature, with length of curve,	- -	
19. Total length of track paved,	6,000 feet.	

* Leased to Middlesex Railroad Co. See Annual Report, 1868, for further particulars.

COST OF EQUIPMENT.		
20. Number of cars, and cost,	} None.	
21. Number of horses, and cost,		
22. Cost of omnibuses, sleighs, and other vehicles, excepting cars, owned by the company,		
23. Cost of real estate, including buildings owned by the company,		
24. Cost of buildings owned by the company, on land not owned by the company,		
25. Cost of other articles of equipment,		
26. Net amount at which the equipment stands charged on the books of the company,		
DOINGS DURING THE YEAR.*		
27. Total number of miles run during the year, [10 months,]		85,572
28. Average cost per mile run,	-	-
29. Total number of passengers carried in the cars,		159,696
30. Total number of round trips run during the year,		4,626
31. Average number of passengers each round trip,	34 54-100	
32. Rate of speed adopted, including stops and detentions,	6 miles.	
33. Number of persons regularly employed, specifying the occupations of each,	14	
EXPENDITURES FOR WORKING THE RAILWAY.		
34. For repairs of railway,	-	-
35. For repairs of equipments,	-	-
36. For repairs of real estate,	-	-
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,	-	-
38. For interest,	-	-
39. For taxes and insurance, other than United States taxes,	-	-
40. For United States taxes,	-	-
41. For rent and tolls paid other companies for use of their roads,	-	-
42. Amount paid other companies for the use of bridges and ferries,	-	-
43. For provender,	-	-
44. For loss on horses,	-	-
45. For incidental expenses,—to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	-	-
46. Total expenses,	-	-
EARNINGS.		
47. Received from passengers in cars and omnibuses, and for tickets sold, [10 months,]	\$16,739 27	
48. From other roads, as toll or rent for use of road,	-	-
49. From other sources, specifying from what source in each item exceeding five hundred dollars,	-	-
50. Total earnings,	-	-
51. Net earnings, after deducting expenses,	-	-
52. Surplus earnings of previous year on hand,	-	-
53. Total surplus,	-	-
54. Dividends declared, during the year,	-	-
55. Total percentage of dividends for the year,	-	-
56. Present surplus,	-	-

* Leased to Middlesex Railroad Co. See Annual Report, 1868, for further particulars.

MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter,	-	-
58. Increase during the year of capital stock paid in, .	-	-
59. Increase of funded debt during the year, . . .	-	-
60. Increase of floating debt during the year, . . .	-	-
61. Decrease of funded debt during the year, . . .	\$4,351	30
62. Decrease of floating debt during the year, . . .	-	-
63. Increase of mortgage debt during the year, . . .	-	-
64. Decrease of mortgage debt during the year, . . .	-	-
65. Increase in cost of road during the year, . . .	-	-
66. Decrease in nominal cost of road,	-	-
67. Increase in cost of equipment, during the year, .	-	-
68. Decrease in cost of equipment during the year, .	-	-
69. Increase of unredeemed tickets during the year, .	-	-
70. Decrease of unredeemed tickets during the year, .	-	-
71. Present amount of unredeemed tickets,	-	-
72. List of accidents on road during the year, . . .	-	-

J. E. M. GILLEY,
J. H. McFARLAND,
Directors of the Malden and Melrose Railway Company.

SUFFOLK, ss. November 4, 1870. Then personally appeared J. E. M. Gilley and J. H. McFarland, Directors of the Malden and Melrose R. R. Co., and severally made oath to the truth of the foregoing statement by them subscribed.

Before J. H. REED, *Justice of the Peace.*

REPORT
OF THE
MARGINAL FREIGHT RAILWAY COMPANY,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY	
1. Capital stock, fixed by charter,	\$1,000,000 00
2. Capital stock, as voted by the company,	\$500,000 00
3. Capital stock paid in, expressed in money,	191,500 00
4. Funded debt,	None.
5. Floating debt, including amount of unredeemed tickets,	46,454 63
6. Total debt,	46,454 63
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	None.
8. Number of mortgages on any other property of the corporation, specifying the amounts,	None.
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	12,000 00
COST OF THE RAILWAY.	
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$151,833 97
CHARACTERISTICS OF THE RAILWAY.	
11. Length of railway laid with single main track,	2,883 feet.
12. Length of railway laid with double main track,	None.
13. Length of branches owned by the company, stating amount of double track, if any,	} 1,985 feet ; 389 feet double track.
14. Aggregate length of switches, sidings, turnouts and other track, excepting main track and branches,	
15. Total length of track, measured as single track,	None beside branches. 5,257 feet.
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	{ 90 lbs. per yard, wrought iron, except 305 ft. flat and grooved rails on short curves.
17. Maximum grade per mile, with length of grade,	
18. Shortest radius of curvature, with length of curve,	{ Substantially level. 185 ft. radius, 198 ft. long on main line; branch, 67 ft. radius, 305 ft. long.
19. Total length of track paved,	

COST OF EQUIPMENT.	
20. Number of cars, and cost,	None.
21. Number of horses, and cost,	None.
22. Cost of omnibuses, sleighs, and other vehicles, excepting cars owned by the company,	None.
23. Cost of real estate, including buildings owned by the company,	None.
24. Cost of buildings owned by the company, on land not owned by the company,	None.
25. Cost of other articles of equipment,	\$40,000 00
26. Net amount at which the equipment stands charged on the books of the company,	40,000 00
DOINGS DURING THE YEAR.	
27. Total number of miles run during the year,	} Not applicable to this road.
28. Average cost per mile run,	
29. Total number of passengers carried in the cars,	
30. Total number of round trips run during the year,	
31. Average number of passengers each round trip,	
32. Rate of speed adopted, including stops and detentions,	} Five.
33. Number of persons regularly employed, specifying the occupations of each, [President, vice-president, clerk, treasurer, freight agent.]	
EXPENDITURES FOR WORKING THE RAILWAY.	
34. For repairs of railway,	\$643 06
35. For repairs of equipments,	None.
36. For repairs of real estate,	None.
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent and treasurer,	416 67
38. For interest,	500 00
39. For taxes and insurance, other than U. S. taxes,	689 48
40. For United States taxes,	None.
41. For rent and tolls paid other companies for use of their roads,	None.
42. Amount paid other companies for the use of bridges and ferries,	None.
43. For provender,	None.
44. For loss on horses,	None.
45. For incidental expenses, — to include printing, president's, directors', superintendent's and treasurer's salaries, and all other expenses not herein before included,	902 26
46. Total expenses,	\$1,318 93
EARNINGS.	
47. Received from passengers in cars and omnibuses, and for tickets sold,	None.
48. From other roads, as toll or rent for use of road,	None.
49. From other sources, specifying from what source in each item exceeding five hundred dollars,	\$1,144 42
50. Total earnings,	\$1,144 42
51. Net earnings, after deducting expenses,	None.
52. Surplus earnings of previous year on hand,	None.
53. Total surplus,	None.
54. Dividends declared during the year,	None.
55. Total percentage of dividends for the year,	None.
56. Present surplus,	None.

MISCELLANEOUS.	
67. Increase during the year of capital stock, as fixed by charter,	None.
68. Increase during the year of capital stock paid in,	\$500 00
69. Increase of funded debt during the year,	None.
60. Increase of floating debt during the year,	12,818 82
61. Decrease of funded debt during the year,	None.
62. Decrease of floating debt during the year,	None.
63. Increase of mortgage debt during the year,	None.
64. Decrease of mortgage debt during the year,	None.
65. Increase in cost of road during the year,	13,492 83
66. Decrease in nominal cost of road,	None.
67. Increase in cost of equipment during the year,	None.
68. Decrease in cost of equipment during the year,	None.
69. Increase of unredeemed tickets during the year,	None.
70. Decrease of unredeemed tickets during the year,	None.
71. Present amount of unredeemed tickets,	None.
72. List of accidents on road during the year,	None.

DANIEL W. LORD,

A. B. CULVER,

EDWARD CRANE,

M. T. GARDNER,

Directors of the Marginal Freight Railway Company.

SUFFOLK, ss. November 1, 1870. Then personally appeared Daniel W. Lord, A. B. Culver, Edward Crane and M. T. Gardner, and severally made oath of the truth of the foregoing statement by them subscribed.

Before

W. B. BROWN, *Justice of the Peace.*

R E P O R T

OF THE

MEDFORD AND CHARLESTOWN RAILWAY COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.	
1. Capital stock, fixed by charter,	\$200,000 00
2. Capital stock, as voted by the company,	\$25,000 00
3. Capital stock paid in, expressed in money,	21,000 00
4. Funded debt,	4,000 00
5. Floating debt, including amount of unredeemed tickets,	-
6. Total debt,	4,000 00
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	} One mortgage; balance due, \$4,000.
8. Number of mortgages on any other property of the corporation, specifying the amounts,	
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	None.
	Nothing.
COST OF THE RAILWAY.	
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$36,000 00
CHARACTERISTICS OF THE RAILWAY.	
11. Length of railway laid with single main track,	16,258 feet.
12. Length of railway laid with double main track,	-
13. Length of branches owned by the company, stating amount of double track, if any,	-
14. Aggregate length of switches, sidings, turnouts and other track, excepting main track and branches,	1,486 feet.
15. Total length of track measured as single track,	17,744 feet.
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	{ 12,000 ft. T rail, 28 lbs. per yd.; 19,926 ft. T rail, 33 lbs per yd.; 2,362 ft. street rail, 45 lbs. per yd.; and 1,200 ft. street rail, 30 lbs. per yd., all wrought iron.

17. Maximum grade per mile, with length of grade, .	242 in 986 feet.
8. Shortest radius of curvature, with length of curve, .	{ 200 ft. radius in 96 feet, length of curve.
19. Total length of track paved,	1,786 feet.
COST OF EQUIPMENT.*	
20. Number of cars and cost,	} Equipped and run by the Middlesex R. R. Co.
21. Number of horses and cost,	
22. Cost of omnibuses, sleighs and other vehicles, ex- cepting cars, owned by the company,	
23. Cost of real estate, including buildings owned by the company,	
24. Cost of buildings owned by the company, on land not owned by the company,	
25. Cost of other articles of equipment,	
26. Net amount at which the equipment stands charged on the books of the company,	
DOINGS DURING THE YEAR.*	
27. Total number of miles run during the year, .	} Reported by the Middlesex R. R. Company.
28. Average cost per mile run,	
29. Total number of passengers carried in the cars, .	
30. Total number of round trips run during the year, .	
31. Average number of passengers each round trip, .	
32. Rate of speed adopted, including stops and de- tentions,	
33. Number of persons regularly employed, specifying the occupations of each,	
EXPENDITURES FOR WORKING THE RAILWAY.	
34. For repairs of railway,	} Equipped and run by the Middlesex R. R. Co.
35. For repairs of equipments,	
36. For repairs of real estate,	
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent and treasurer,	
38. For interest, [on bonds of the Medford and Charlestown R. R. Co.,]	
39. For taxes and insurance, other than United States taxes,	
40. For United States taxes,	\$135 00
41. For rent and tolls paid other companies for use of their roads,	20 00
42. Amount paid other companies for the use of bridges and ferries,	84 25
43. For provender,	- -
44. For loss on horses,	- -
45. For incidental expenses,—to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	- -
46. Total expenses,	- -
EARNINGS.†	
47. Received from passengers in cars and omnibuses and for tickets sold,	- -
48. From other roads, as toll or rent for use of road, .	- -

* The Medford and Charlestown Railroad is run by the Middlesex Railroad Company, at an annual rental of \$2,240.
† Reported by the Middlesex Railroad Company.

278 MEDFORD & CHARLESTOWN [ST.] RAILWAY. [Jan.

49. From other sources, specifying from what source, in each item exceeding five hundred dollars,	-	-
50. Total earnings, [rent of road,]		\$1,120 00
51. Net earnings, after deducting expenses,	-	-
52. Surplus earnings of previous year on hand,	-	-
53. Total surplus,	-	-
54. Dividends declared, during the year,	None.	
55. Total percentage of dividends for the year,	-	-
56. Present surplus,	\$287 48	
MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter,	-	-
58. Increase during the year of capital stock paid in,	-	-
59. Increase of funded debt during the year,	-	-
60. Increase of floating debt during year,	-	-
61. Decrease of funded debt during the year,	\$500 00	
62. Decrease of floating debt during the year,	98 27	
63. Increase of mortgage debt during the year,	-	-
64. Decrease of mortgage debt during the year,	500 00	
65. Increase in cost of road during the year,	-	-
66. Decrease in nominal cost of road,	-	-
67. Increase in cost of equipment during the year,	-	-
68. Decrease in cost of equipment during the year,	-	-
69. Increase of unredeemed tickets during the year,	-	-
70. Decrease of unredeemed tickets during the year,	-	-
71. Present amount of unredeemed tickets,	-	-
72. List of accidents on road during the year,	-	-

LUTHER FARWELL,
CHAS. CUMMINGS,
WILLIAM HASKINS,

Directors of the Medford and Charlestown Railway Company.

MIDDLESEX, ss. November 3, 1870. Then personally appeared Luther Farwell, Charles Cummings and William Haskins, and severally made oath of the truth of the foregoing statement by them subscribed.

Before

JAMES O. CURTIS, *Justice of the Peace.*

REPORT

OF THE

MERRIMACK VALLEY HORSE RAILWAY COMPANY

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter,		\$80,000 00
2. Capital stock, as voted by the company,	\$50,000 00	
3. Capital stock paid in, expressed in money,	50,000 00	
4. Funded debt,	-	-
5. Floating debt, including amount of unredeemed tickets,	6,000 00 174 76	6,174 76
6. Total debt,	-	-
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	-	-
8. Number of mortgages on any other property of the corporation, specifying the amounts,	-	-
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	-	-
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$30,723 26	
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	25,778 ft.	
12. Length of railway laid with double main track,	-	-
13. Length of branches owned by the company, stating amount of double track, if any,	-	-
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	1,200 ft.	
15. Total length of track measured as single track,	26,978 ft.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,		
[O'Brien, 19 lbs. to yard, 16,232 ft.,]	} 26,978 ft.	
[T rail, 30 lbs to yard, 10,746 ft.,]		
17. Maximum grade per mile, with length of grade,	-	-
18. Shortest radius of curvature, with length of curve,	35 ft. radius ; 55 ft. curve.	
19. Total length of track paved,	932 ft.	

COST OF EQUIPMENT.			
20. Number of cars, and cost, [6]	\$6,987 50		
21. Number of horses, and cost, [43]	5,629 20		
22. Cost of omnibuses, sleighs and other vehicles, excepting cars, owned by the company,	1,955 00		
23. Cost of real estate, including buildings owned by the company,	8,493 82		
24. Cost of buildings owned by the company, on land not owned by the company,	-	-	
25. Cost of other articles of equipment,	2,687 12		
26. Net amount at which the equipment stands charged on the books of the company,	11,482 92		
DOINGS DURING THE YEAR.			
27. Total number of miles run during the year,	79,140		
28. Average cost per mile run,	29½ cts.		
29. Total number of passengers carried in the cars,		291,115	
30. Total number of round trips run during the year,		13,090	
31. Average number of passengers each round trip	22		
32. Rate of speed adopted, including stops and detentions,	4½ miles.		
33. Number of persons regularly employed, specifying the occupations of each, [Sup't, 6 conductors, 6 drivers, 4 stable hands, 2 road hands, 1 watchman.]	20		
EXPENDITURES FOR WORKING THE RAILWAY.			
34. For repairs of railway,	}	\$3,643 15	
[Regular repairs, \$954 91,] [Paving, &c., 2,688 24,]			
35. For repairs of equipments,		1,039 55	
36. For repairs of real estate,		60 58	
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent and treasurer,		7,593 63	
38. For interest,		350 00	
39. For taxes and insurance, other than United States taxes,		448 27	
40. For United States taxes,		612 36	
41. For rent and tolls paid other companies for use of their roads,		-	-
42. Amount paid other companies for the use of bridges and ferries,		-	-
43. For provender,		5,950 99	
44. For loss on horses,		229 20	
45. For incidental expenses,—to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,		3,447 90	
46. Total expenses,			\$23,375 63
EARNINGS.			
47. Received from passengers in cars and omnibuses, and for tickets sold,	\$22,800 77		
48. From other roads, as toll or rent for use of road,	-	-	
49. From other sources, specifying from what source in each item exceeding five hundred dollars,	574 86		
50. Total earnings,			\$23,375 63
51. Net earnings, after deducting expenses,	-	-	
52. Surplus earnings of previous year on hand,	-	-	
53. Total surplus,	-	-	

54. Dividends declared during the year, . . .	-	-
55. Total percentage of dividends for the year, . .	-	-
56. Present surplus,	-	-
MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter,	-	-
58. Increase during the year of capital stock paid in,	-	-
59. Increase of funded debt during the year, . . .	-	-
60. Increase of floating debt during the year, . . .	-	-
61. Decrease of funded debt during the year, . . .	-	-
62. Decrease of floating debt during the year, . . .	\$26 68	-
63. Increase of mortgage debt during the year, . . .	-	-
64. Decrease of mortgage debt during the year, . . .	-	-
65. Increase in cost of road during the year, . . .	-	-
66. Decrease in nominal cost of road,	-	-
67. Increase in cost of equipment during the year, . . .	-	-
68. Decrease in cost of equipment during the year, . . .	137 30	-
69. Increase of unredeemed tickets during the year, . . .	-	-
70. Decrease of unredeemed tickets during the year, . . .	26 68	-
71. Present amount of unredeemed tickets,	174 76	-
72. List of accidents on road during the year, . . .	-	-

W. A. RUSSELL,
MOSES T. STEVENS,
A. W. STEARNS,
JAMES WALTON,
HEZEKIAH PLUMMER,

Directors of the Merrimack Valley Horse Railroad Company.

October 25, 1870. Then personally appeared W. A. Russell, Moses T. Stevens, A. W. Stearns, James Walton and Hezekiah Plummer, and severally made oath of the truth of the foregoing statement by them subscribed.

Before . JAMES H. EATON, *Justice of the Peace.*

REPORT

OF THE

METROPOLITAN RAILROAD COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.	
1. Capital stock, fixed by charter,	\$1,950,000 00
2. Capital stock, as voted by the company,	\$1,250,000 00
3. Capital stock paid in, expressed in money,	1,250,000 00
4. Funded debt,	None.
5. Floating debt, including amount of unredeemed tickets,	297,271 53
6. Total debt,	297,271 53
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	None.
8. Number of mortgages on any other property of the corporation, specifying the amounts,	None.
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	45,474 34
COST OF THE RAILWAY.	
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$972,486 92
CHARACTERISTICS OF THE RAILWAY.	
11. Length of railway laid with single main track,	17 404-1,000 miles.
12. Length of railway laid with double main track,	8 403-1,000 miles.
13. Length of branches owned by the company, stating amount of double track, if any,	7 851-1,000 miles.
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	2 749-1,000 miles.
15. Total length of track measured as single track,	44 820-1,000 miles.
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron, [wrought iron,]	From 28 to 56 lbs.
17. Maximum grade per mile, with length of grade,	251 52-100 for 400 feet.
18. Shortest radius of curvature, with length of curve,	30 feet for 48 feet.
19. Total length of track paved,	31 153-1,000 miles.

COST OF EQUIPMENT.

20. Number of cars and cost,	[170]	\$153,165 94
21. Number of horses and cost,	[914]	113,669 69
22. Cost of omnibuses, sleighs and other vehicles, excepting cars, owned by the company,		68,423 35
23. Cost of real estate, including buildings owned by the company,		265,787 35
24. Cost of buildings owned by the company, on land not owned by the company,		13,922 86
25. Cost of other articles of equipment,		47,138 71
26. Net amount at which the equipment stands charged on the books of the company,		652,107 40

DOINGS DURING THE YEAR.

27. Total number of miles run during the year, [10 mos.,]		1,682,048
28. Average cost per mile run,	34 82-100 cents.	
29. Total number of passengers carried in the cars,		11,877,199
30. Total number of round trips run during the year, [10 mos.,]		281,152
31. Average number of passengers each round trip,	42	
32. Rate of speed adopted, including stops and detentions,	5 to 6 miles per hour.	
33. Number of persons regularly employed, specifying the occupations of each,	559	
[President, treasurer, secretary, general superintendent, superintendent of construction and repairs, 2 station agents, 6 clerks, 6 receivers, 67 mechanics, 11 pavers, 20 track-repairers, 9 starters, 8 track-men, 138 conductors, 143 drivers, 55 hostlers, 8 feeders, 28 watchmen, 14 switchmen, 9 shifters, 2 millers, 28 helpers.]		

EXPENDITURES FOR WORKING THE RAILWAY.

34. For repairs of railway,	\$38,542 12	
35. For repairs of equipments,	27,194 62	
36. For repairs of real estate,	8,546 25	
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,	240,952 98	
38. For interest,	15,136 80	
39. For taxes and insurance, other than United States taxes,	8,305 28	
40. For United States taxes,	19,886 93	
41. For rent and tolls paid other companies for use of their roads,	2,770 94	
42. Amount paid other companies for the use of bridges and ferries,	Nothing.	
43. For provender,	123,318 93	
44. For loss on horses,	14,234 60	
45. For incidental expenses, — to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	91,895 31	
46. Total expenses,		\$585,784 76

EARNINGS.

47. Received from passengers in cars and omnibuses, and for tickets sold,	\$669,342 85
48. From other roads, as toll or rent for use of road,	3,222 82

49. From other sources, specifying from what source in each item exceeding five hundred dollars, [U. S. mails and manure,]	\$12,738 00	
50. Total earnings,		\$685,303 17
51. Net earnings, after deducting expenses,	99,518 41	
52. Surplus earnings of previous year on hand,	77,802 86	
53. Total surplus,		177,321 27
54. Dividends declared during the year,	Two.	
55. Total percentage of dividends for the year,	Ten per cent. and U. S. tax.	
56. Present surplus,	45,742 33	
MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter,	None.	
58. Increase during the year of capital stock paid in,	None.	
59. Increase of funded debt during the year, [10 mos.,]	None.	
60. Increase of floating debt during the year, [10 mos.,]	\$63,816 82	
61. Decrease of funded debt during the year, [10 mos.,]	None.	
62. Decrease of floating debt during the year, [10 mos.,]	None.	
63. Increase of mortgage debt during the year, [10 mos.,]	None.	
64. Decrease of mortgage debt during the year, [10 mos.,]	None.	
65. Increase in cost of road during the year, [10 mos.,]	8,499 86	
66. Decrease in nominal cost of road,	None.	
67. Increase in cost of equipment during the year, [10 mos.,]	21,101 30	
68. Decrease in cost of equipment during the year, [10 mos.,]	None.	
69. Increase of unredeemed tickets during the year, [10 mos.,]	65 00	
70. Decrease of unredeemed tickets during the year, [10 mos.,]	None.	
71. Present amount of unredeemed tickets,	14,370 02	
72. List of accidents on road during the year, [10 mos.,]	-	-

ACCIDENTS.

December 14, 1869.—A man fell from front platform of a car, was badly injured, and died at City Hospital.

January 17, 1870.—A man, in jumping on to a moving car, missed his footing, fell and broke his ankle, dying from other causes at Mass. Gen'l Hospital on 24th January.

January 22.—One of the Soldiers' Messenger Corps, in attempting to jump on the front platform of a moving car, slipped and fell, injuring his arm.

May 23.—A man, in stepping from the front platform of a moving car, fell, and was instantly killed.

May 25.—An employé of this company fell from his car and died from his injuries.

June 4.—A man, in stepping from the front platform of a car in motion, fell, was run over, was badly injured, and died at the Mass. Gen'l Hospital the next day from his injuries.

September 6.—A man, intoxicated, ran directly in front of the horses of a car in motion, was knocked down, run over and killed.

September 21.—A man jumped from the front platform of a car in motion, fell, was run over, and died soon after at City Hospital.

Several slight accidents have occurred, since December 1st, 1869, to persons very **carelessly** getting on and off cars in motion, generally upon front platform.

JOHN W. DRAPER,
G. H. VINCENT,
LIBERTY BIGELOW,
WILLIAM HENDRY,
CHAS. U. COTTING,
WM. GASTON,

Directors of the Metropolitan Railway Company.

Boston, October 31, 1870. Then personally appeared John W. Draper, G. H. Vincent, **Liberty** Bigelow, William Hendry, Charles U. Cotting and Wm. Gaston, and **severally** made oath of the truth of the foregoing statement by them subscribed.
Before

JOHN L. ANDREWS, *Justice of the Peace.*

REPORT
OF THE
MIDDLESEX RAILWAY COMPANY,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter,		\$550,000 00
2. Capital stock, as voted by the company,	\$400,000 00	
3. Capital stock paid in, expressed in money,	400,000 00	
4. Funded debt,	-	-
5. Floating debt, including amount of unredeemed tickets,	81,557 91	
6. Total debt,	-	-
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	One for \$100,000.*	
8. Number of mortgages on any other property of the corporation, specifying the amounts,	Two—\$6,000 and \$10,000.	
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	95,877 54	
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$369,064 21	
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	9,782 feet.	
12. Length of railway laid with double main track,	13,163 feet.	
13. Length of branches owned by the company, stating amount of double track, if any,	Somerville Branch, 2,436 ft.	
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	3,432 feet.	
15. Total length of track measured as single track,	43,577 ft.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	{ Rolled iron, 31,273 ft., 56 lbs. per yard; 5,831 ft., 42 lbs. per yard; 4,263 ft., 33 lbs. per yard.	
17. Maximum grade per mile, with length of grade,	251 ft., 400 ft.	
18. Shortest radius of curvature, with length of curve,	36 ft., 48 ft.	
19. Total length of track paved,	All paved but 4,263 ft.	

* One for \$100,000—\$99,500 issued, reduced by sinking fund, \$18,189.17.

COST OF EQUIPMENT.

20. Number of cars, and cost, [49]	\$43,643 17
21. Number of horses, and cost, [247]	36,925 00
22. Cost of omnibuses, sleighs, and other vehicles, excepting cars, owned by the company,	9,241 54
23. Cost of real estate, including buildings owned by the company,	49,713 67
24. Cost of buildings owned by the company, on land not owned by the company,	5,000 00
25. Cost of other articles of equipment,	16,779 44
26. Net amount at which the equipment stands charged on the books of the company,	161,302 82

DOINGS DURING THE YEAR.

27. Total number of miles run during the year, [10 months,]	432,139
28. Average cost per mile run,	36 87-100 cents.
29. Total number of passengers carried in the cars, [10 months,]	2,807,788
30. Total number of round trips run during the year, [10 months,]	79,713
31. Average number of passengers each round trip,	35 22-100
32. Rate of speed adopted, including stops and detentions,	5 miles per hour.
33. Number of persons regularly employed, specifying the occupations of each, [President, treasurer, superintendent, 2 clerks, 2 overseers of stables, 31 conductors, 31 drivers, 17 hostlers, 2 shifters, 4 mechanics, (car shop,) 2 painters, 6 blacksmiths, 1 harness-maker, 4 watchmen, 13 road-men, 1 harness cleaner, 2 switchmen, 1 station agent, 4 feeders, 2 helpers, 2 inspectors.]	130

EXPENDITURES FOR WORKING THE RAILWAY [FOR TEN MONTHS.]

34. For repairs of railway,	\$7,500 00
35. For repairs of equipments,	15,575 55
36. For repairs of real estate,	366 70
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,	53,259 22
38. For interest,	9,191 49
39. For taxes and insurance, other than United States taxes,	2,082 91
40. For United States taxes,	5,056 29
41. For rent and tolls paid other companies for use of their roads,	1,866 66
42. Amount paid other companies for the use of bridges and ferries,	737 50
43. For provender,	88,629 07
44. For loss on horses,	4,246 00
45. For incidental expenses,—to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	20,834 59
46. Total expenses,	\$159,345 98

EARNINGS.

47. Received from passengers in cars and omnibuses, and for tickets sold,	\$170,374 83
48. From other roads, as toll or rent for use of road,	-

49. From other sources, specifying from what source in each item exceeding five hundred dollars, [manure,]	\$1,865 68	
50. Total earnings,		\$172,240 51
51. Net earnings, after deducting expenses,	12,894 53	
52. Surplus earnings of previous year on hand,	9,330 36	
53. Total surplus,		22,224 89
54. Dividends declared, during the year,	One.	
55. Total percentage of dividends for the year,	3 per cent.	
56. Present surplus,	22,224 89	
MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter,	None.	
58. Increase during the year of capital stock paid in,	None.	
59. Increase of funded debt during the year,	None.	
60. Increase of floating debt during the year,	\$38,226 46	
61. Decrease of funded debt during the year,	3,726 67	
62. Decrease of floating debt during the year,	None.	
63. Increase of mortgage debt during the year,	None.	
64. Decrease of mortgage debt during the year,	None.	
65. Increase in cost of road during the year,	589 98	
66. Decrease in nominal cost of road,	None.	
67. Increase in cost of equipment, during the year,	575 00	
68. Decrease in cost of equipment during the year,	None.	
69. Increase of unredeemed tickets during the year,	None.	
70. Decrease of unredeemed tickets during the year,	146 86	
71. Present amount of unredeemed tickets,	1,821 45	
72. List of accidents on road during the year,	-	-

No serious accidents of any kind during the ten months ending Sept. 30, 1870.

CHARLES E. POWERS,
JOHN GOLDTHWAIT,
CALEB RAND,
LUTHER FARWELL,
GEO. W. PALMER,
WM. H. KENT,
JAMES BECK,
NAHUM CHAPIN,

Directors of the Middlesex Railway Company.

SUFFOLK, ss. November 5, 1870. Then personally appeared Charles E. Powers, John Goldthwait, Caleb Rand, Luther Farwell, George W. Palmer and Wm. H. Kent, and severally made oath of the truth of the foregoing statement by them subscribed, to their best knowledge and belief.

Before me,

LINUS M. CHILD, *Justice of the Peace.*

REPORT

OF THE

NORTHAMPTON & WILLIAMSBURG RAILWAY COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter,		\$800,000 00
2. Capital stock, as voted by the company,	\$300,000 00	
3. Capital stock paid in, expressed in money,	800,000 00	
4. Funded debt,	-	-
5. Floating debt, including amount of unredeemed tickets,	3,853 39	
6. Total debt,	-	-
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	-	-
8. Number of mortgages on any other property of the corporation, specifying the amounts,	One—\$2,700.	
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	614 80	
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	Road built and equipped by contract—\$301,000.	
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	3 22-100 miles.	
12. Length of railway laid with double main track,	-	
13. Length of branches owned by the company, stating amount of double track, if any,	-	
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	200 feet.	
15. Total length of track, measured as single track,	17,856 feet.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	17,398 ft. wrought rail, 33 lbs. per y'd; 458 ft. cast rail, 72 lbs per y'd.	
17. Maximum grade per mile, with length of grade,	264 ft. per mile, 790 ft.	
18. Shortest radius of curvature, with length of curve,	50 ft. radius, 200 ft.	
19. Total length of track paved,	200 feet.	

COST OF EQUIPMENT.		
20. Number of cars and cost,	} 3 cars, 2 sleighs. See Cost of the Railway.	
21. Number of horses and cost,		
22. Cost of omnibuses, sleighs, and other vehicles, excepting cars, owned by the company,		
23. Cost of real estate, including buildings owned by the company,		
24. Cost of buildings owned by the company, on land not owned by the company,		
25. Cost of other articles of equipment,		
26. Net amount at which the equipment stands charged on the books of the company,		
DOINGS DURING THE YEAR.		
27. Total number of miles run during the year,		25,774
28. Average cost per mile run,	34½ cts.	
29. Total number of passengers carried in the cars,		102,329
30. Total number of round trips run during the year,		4,002
31. Average number of passengers each round trip,	20½	
32. Rate of speed adopted, including stops and detentions,	6 miles per hour.	
33. Number of persons regularly employed, (specifying the occupations of each,) [1 clerk, 2 conductors, 2 drivers, 2 hostlers, 1 stable overseer, 1 watchman, 1 road-man.]	-	-
EXPENDITURES FOR WORKING THE RAILWAY.		
34. For repairs of railway,	\$526 96	
35. For repairs of equipments,	336 66	
36. For repairs of real estate,	118 87	
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,	4,228 83	
38. For interest,	214 75	
39. For taxes and insurance, other than United States taxes,	256 10	
40. For United States taxes,	235 61	
41. For rent and tolls paid other companies for use of their roads,	-	-
42. Amount paid other companies for the use of bridges and ferries,	-	-
43. For provender,	1,933 55	
44. For loss on horses,	300 00	
45. For incidental expenses, — to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	2,116 35	
46. Total expenses,		\$10,327 68
EARNINGS.		
47. Received from passengers in cars and omnibuses, and for tickets sold,	\$8,288 55	
48. From other roads, as toll or rent for use of road,	-	-
49. From other sources, specifying from what source in each item, exceeding five hundred dollars, [Rents, \$684.44 ; sales matcrial, \$420,]	1,104 44	
50. Total earnings,		\$9,392 59
51. Net earnings, after deducting expenses,	-	-
52. Surplus earnings of previous year on hand,	-	-
53. Total surplus,	-	-
54. Dividends declared during the year,	-	-
55. Total percentage of dividends for the year,	-	-
56. Present surplus,	-	-

MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter, . . .	-	-
58. Increase during the year of capital stock paid in, . . .	-	-
59. Increase of funded debt during the year, . . .	-	-
60. Increase of floating debt during the year, . . .	\$3,853 39	-
61. Decrease of funded debt during the year, . . .	-	-
62. Decrease of floating debt during the year, . . .	-	-
63. Increase of mortgage debt during the year, . . .	-	-
64. Decrease of mortgage debt during the year, . . .	500 00	-
65. Increase in cost of road during the year, . . .	-	-
66. Decrease in nominal cost of road, . . .	-	-
67. Increase in cost of equipment during the year, . . .	-	-
68. Decrease in cost of equipment during the year, . . .	-	-
69. Increase of unredeemed tickets during the year, . . .	5 20	-
70. Decrease of unredeemed tickets during the year, . . .	-	-
71. Present amount of unredeemed tickets, . . .	14 08	-
72. List of accidents on road during the year, . . .	-	-

E. B. WELLS,

J. L. WARRINER,

M. H. SPAULDING,

Directors of the Northampton and Williamsburg Railway Company.

HAMPSHIRE, ss. November 10, 1870. Then personally appeared E. B. Wells, J. L. Warriner, and M. H. Spaulding, and severally made oath of the truth of the foregoing statement by them subscribed.

Before

ELIPHALET WILLIAMS, *Justice of the Peace.*

REPORT

OF THE

NORTH WOBURN RAILWAY COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter,		\$50,000 00
2. Capital stock, as voted by the company,	\$25,000 00	
3. Capital stock paid in, expressed in money,	25,000 00	
4. Funded debt,	8,000 00	
5. Floating debt, including amount of unredeemed tickets,	-	-
6. Total debt,		11,194 94
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	-	-
8. Number of mortgages on any other property of the corporation, specifying the amounts,	-	-
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	-	-
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$24,012 11	
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	2 miles, 5 furlongs, 10 rods.	
12. Length of railway laid with double main track,	-	-
13. Length of branches owned by the company, stating amount of double track, if any,	-	-
14. Aggregate length of switches, sidings, turnouts and other track, excepting main track and branches,	{ One turnout, 160 ft.; one side track, 100 ft.	
15. Total length of track measured as single track,	2 miles, 5 furlongs, 25 rods.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	{ 106 rods wrought flat rail; balance, wrought T rail, 41 lbs. per yard.	
17. Maximum grade per mile, with length of grade,	5.18 feet in 100 feet.	
18. Shortest radius of curvature, with length of curve,	518.7 feet for 150 feet.	
19. Total length of track paved,	2,210 feet.	

Cost of Equipment.		
20. Number of cars, and cost,	.	.
21. Number of horses, and cost,	.	.
22. Cost of omnibuses, sleighs, and other vehicles, excepting cars, owned by the company,	.	.
23. Cost of real estate, including buildings owned by the company,	.	.
24. Cost of buildings owned by the company, on land not owned by the company,	.	.
25. Cost of other articles of equipment,	.	.
26. Net amount at which the equipment stands charged on the books of the company,	.	.
Doings during the Year.		
27. Total number of miles run during the year, [10 mos., to Sept. 30,]	.	15,843½
28. Average cost per mile run,*	.	-
29. Total number of passengers carried in the cars,	.	58,953
30. Total number of round trips run during the year,	.	3,000
31. Average number of passengers each round trip,	.	19 6½-10
32. Rate of speed adopted, including stops and detentions,	.	6½ miles per hour.
33. Number of persons regularly employed, specifying the occupations of each, [One hostler, one conductor, one driver.]	.	-
Expenditures for Working the Railway.		
34. For repairs of railway,	.	.
35. For repairs of equipments,	.	.
36. For repairs of real estate,	.	.
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,	.	.
38. For interest,	.	.
39. For taxes and insurance, other than United States taxes,	.	.
40. For United States taxes,	.	.
41. For rent and tolls paid other companies for use of their roads,	.	.
42. Amount paid other companies for the use of bridges and ferries,	.	.
43. For provender,	.	.
44. For loss on horses,	.	.
45. For incidental expenses, — to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	.	.
46. Total expenses,	.	.
Earnings.		
47. Received from passengers in cars and omnibuses, and for tickets sold,	.	.
48. From other roads, as toll or rent for use of road,	.	.
49. From other sources, specifying from what source in each item exceeding five hundred dollars,	.	.
50. Total earnings,	.	\$1,920 00
51. Net earnings, after deducting expenses,	.	None.
52. Surplus earnings of previous year on hand,	.	-
53. Total surplus,	.	-
54. Dividends declared during the year,	.	None.
55. Total percentage of dividends for the year,	.	-
56. Present surplus,	.	None.

* Horses used a part of the time for other purposes. Cannot ascertain the average cost per mile.

MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter,	-	-
58. Increase during the year of capital stock paid in, .	-	-
59. Increase of funded debt during the year, . . .	-	-
60. Increase of floating debt during the year, . . .	-	-
61. Decrease of funded debt during the year, . . .	-	-
62. Decrease of floating debt during the year, . . .	-	-
63. Increase of mortgage debt during the year, . . .	-	-
64. Decrease of mortgage debt during the year, . . .	-	-
65. Increase in cost of road during the year, . . .	-	-
66. Decrease in nominal cost of road,	-	-
67. Increase in cost of equipment during the year, .	-	-
68. Decrease in cost of equipment during the year, .	-	-
69. Increase of unredeemed tickets during the year, .	-	-
70. Decrease of unredeemed tickets during the year, .	-	-
71. Present amount of unredeemed tickets,	-	-
72. List of accidents on road during the year, . . .	-	-

MOSES F. WINN,
CHARLES BOND,
E. E. THOMPSON,
ALBERT THOMPSON,
Directors of the North Woburn Street R. R. Co.

MIDDLESEX, ss. October 17, 1870. Then personally appeared Moses F. Winn, Charles Bond, E. E. Thompson and Albert Thompson, and severally made oath of the truth of the foregoing statement by them subscribed.
Before JOHN JOHNSON, *Justice of the Peace.*

REPORT

OF THE

SALEM RAILWAY COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.

1. Capital stock, fixed by charter,		\$150,000 00
2. Capital stock, as voted by the company,	\$150,000 00	
3. Capital stock paid in, expressed in money,	150,000 00	
4. Funded debt,	35,600 00	
5. Floating debt, including amount of unredeemed tickets,	22,967 61	
6. Total debt,		58,567 61
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	{ One mortgage and supplementary mortgage to secure \$40,000 of bonds.	
8. Number of mortgages on any other property of the corporation, specifying the amounts,	{ One of \$1,800 on house and land.	
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	6,146 84	

COST OF THE RAILWAY.

10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$203,484 52
--	--------------

CHARACTERISTICS OF THE RAILWAY.

11. Length of railway laid with single main track,	5 miles and 1,593 feet.
12. Length of railway laid with double main track,	None.
13. Length of branches owned by the company, stating amount of double track, if any,	{ So. Salem, 1 mile and 640 ft.; No. Salem, 5,211 ft.
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	
15. Total length of track, measured as single track,	2,310 feet.
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	7 miles and 4,474 feet.
17. Maximum grade per mile, with length of grade,	{ 71 and 45 lbs., cast iron; 33 and 19 lbs., wrought iron.
	190 feet per mile for $\frac{1}{4}$ of a mile.

18. Shortest radius of curvature, with length of curve,	50 ft. for a distance of 75 ft.	
19. Total length of track paved,	17,643 feet.	
[Whole pavement, 11,103 feet,]		
[Two rails, 678 feet,]		
[One rail, 5,261 feet,]		
[Inside rails, 601 feet,]		
COST OF EQUIPMENT.		
20. Number of cars, and cost,	21 cars.	
21. Number of horses, and cost,	47 horses.	
22. Cost of omnibuses, sleighs and other vehicles, excepting cars, owned by the company,	-	-
23. Cost of real estate, including buildings owned by the company,	Assessed for \$13,000.	
24. Cost of buildings owned by the company, on land not owned by the company,	None.	
25. Cost of other articles of equipment,	-	-
26. Net amount at which the equipment stands charged on the books of the company,	Included in No. 10.	
DOINGS DURING THE YEAR. [10 MONTHS.]		
27. Total number of miles run during the year,		120,625
28. Average cost per mile run,	30 58-100 cents.	
29. Total number of passengers carried in the cars,		616,627
30. Total number of round trips run during the year,		33,688
31. Average number of passengers each round trip,	18 3-10	
32. Rate of speed adopted, including stops and detentions,	About 5 miles per hour.	
33. Number of persons regularly employed, specifying the occupations of each,	31	
[Superintendent, (who is also clerk,) treasurer, assistant-treasurer, receiver, 3 conductors, 10 drivers, 2 blacksmiths, 1 carpenter, 7 stable hands, 4 track repairers.]		
EXPENDITURES FOR WORKING THE RAILWAY.		
34. For repairs of railway,	\$2,000 00	
35. For repairs of equipments,	2,391 54	
36. For repairs of real estate,	156 18	
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,	13,727 71	
38. For interest,	2,249 38	
39. For taxes and insurance, other than U. S. taxes,	770 63	
40. For United States taxes,	873 61	
41. For rent and tolls paid other companies for use of their roads,	-	-
42. Amount paid other companies for the use of bridges and ferries,	-	-
43. For provender,	9,787 87	
44. For loss on horses,	-	-
45. For incidental expenses,—to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	4,791 38	
46. Total expenses,		\$36,698 25
EARNINGS.		
47. Received from passengers in cars and omnibuses, and for tickets sold,	\$35,424 92	
48. From other roads, as toll or rent for use of road,	-	-

49. From other sources, specifying from what source in each item exceeding five hundred dollars, [manure,]	\$895 54	
50. Total earnings,		\$36,320 46
51. Net earnings, after deducting expenses,	-	-
52. Surplus earnings of previous year on hand,	-	-
53. Total surplus,	-	-
54. Dividends declared during the year,	-	-
55. Total percentage of dividends for the year,	-	-
56. Present surplus,	2,540 23	
MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter,	-	-
58. Increase during the year of capital stock paid in,	-	-
59. Increase of funded debt during the year,	-	-
60. Increase of floating debt during the year,	\$7,613 75	
61. Decrease of funded debt during the year,	-	-
62. Decrease of floating debt during the year,	-	-
63. Increase of mortgage debt during the year,	-	-
64. Decrease of mortgage debt during the year,	-	-
65. Increase in cost of road during the year,	-	-
66. Decrease in nominal cost of road,	-	-
67. Increase in cost of equipment during the year,	11,134 30	
68. Decrease in cost of equipment during the year,	-	-
69. Increase of unredeemed tickets during the year,	1,234 59	
70. Decrease of unredeemed tickets during the year,		-
71. Present amount of unredeemed tickets,	1,470 61	
72. List of accidents on road during the year,	-	-

ACCIDENTS.

On the 26th of March, Carleton Dole, of Salem, stepped from the rear platform of a car about leaving the turnout in Beverly, without notice to the driver, and received injuries from which he died.

On the first of October, Samuel Bell, of Beverly, fell from the front platform of a car in Beverly, and received injuries from which he died.

ABNER C. GOODELL, JR.,
WILLIAM MACK,
HENRY WHEATLAND,
Directors of the Salem Railway Company.

Essex, ss. November 2, 1870. Then personally appeared Abner C. Goodell, Jr., William Mack and Henry Wheatland, and severally made oath of the truth of the foregoing statement by them subscribed.
Before WILLIAM MAYNES, *Justice of the Peace.*

REPORT

OF THE

SOMERVILLE HORSE RAILWAY COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter,		\$100,000 00
2. Capital stock, as voted by the company,	\$75,000 00	
3. Capital stock paid in, expressed in money,	75,000 00	
4. Funded debt,	} None.	
5. Floating debt, including amount of unredeemed tickets,		
6. Total debt,		
7. Number of mortgages on road and franchise, and amount of debt secured thereby,		
8. Number of mortgages on any other property of the corporation, specifying the amounts,		
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,		
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,		\$75,000 00
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	19,041 feet.	
12. Length of railway laid with double main track,	None.	
13. Length of branches owned by the company, stating amount of double track, if any,	None.	
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	598 feet.	
15. Total length of track measured as single track,	19,639 feet.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	} 6,781 feet, rolled, 42 lbs. per yard ; 12,858 feet, rolled, 28 lbs per yard.	
17. Maximum grade per mile, with length of grade,		Nominal.
18. Shortest radius of curvature, with length of curve,	168 feet, 75 feet.	
19. Total length of track paved,	6,781 feet.	

COST OF EQUIPMENT.

20. Number of cars, and cost,
 21. Number of horses, and cost,
 22. Cost of omnibuses, sleighs and other vehicles, excepting cars, owned by the company,
 23. Cost of real estate, including buildings owned by the company,
 24. Cost of buildings owned by the company, on land not owned by the company,
 25. Cost of other articles of equipment,
 26. Net amount at which the equipment stands charged on the books of the company,

No equipment. Road operated by Middlesex and Union Railway Companies.

DOINGS DURING THE YEAR.

27. Total number of miles run during the year, [10 months,]
 28. Average cost per mile run,
 29. Total number of passengers carried in the cars,
 30. Total number of round trips run during the year,
 31. Average number of passengers each round trip
 32. Rate of speed adopted, including stops and detentions,
 33. Number of persons regularly employed, specifying the occupations of each,

Union Square Line, 22,340*

—

117,185*

8,345*

14 4-100*

6 miles.*

—

—

EXPENDITURES FOR WORKING THE RAILWAY.

34. For repairs of railway,
 35. For repairs of equipments,
 36. For repairs of real estate,
 37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent and treasurer,
 38. For interest,
 39. For taxes and insurance, other than United States taxes,
 40. For United States taxes,
 41. For rent and tolls paid other companies for use of their roads,
 42. Amount paid other companies for the use of bridges and ferries,
 43. For provender,
 44. For loss on horses,
 45. For incidental expenses,—to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,
 46. Total expenses,

All paid by lessees.

EARNINGS.

47. Received from passengers in cars and omnibuses, and for tickets sold,
 48. From other roads, as toll or rent for use of road,
 49. From other sources, specifying from what source in each item exceeding five hundred dollars,
 50. Total earnings,
 51. Net earnings, after deducting expenses,
 52. Surplus earnings of previous year on hand,
 53. Total surplus,
 54. Dividends declared during the year,
 55. Total percentage of dividends for the year,
 56. Present surplus,

Received by lessees.

\$4,500 00

Nothing.

\$4,500 00

4,500 00

None.

None.

Two.

6 per cent.

—

—

* This Company is unable to give the required information in relation to "Doings during the Year" of the Milk Street line, as the lessees declined furnishing it.

MISCELLANEOUS.	
57. Increase during the year of capital stock, as fixed by charter,	} None.
58. Increase during the year of capital stock paid in,	
59. Increase of funded debt during the year,	
60. Increase of floating debt during the year,	
61. Decrease of funded debt during the year,	
62. Decrease of floating debt during the year,	
63. Increase of mortgage debt during the year,	
64. Decrease of mortgage debt during the year,	
65. Increase in cost of road during the year,	
66. Decrease in nominal cost of road,	
67. Increase in cost of equipment during the year,	
68. Decrease in cost of equipment during the year,	
69. Increase of unredeemed tickets during the year,	
70. Decrease of unredeemed tickets during the year,	
71. Present amount of unredeemed tickets,	
72. List of accidents on road during the year,	

CHARLES E. POWERS,
S. E. SEWALL,
R. E. DEMMON,
ENOCH ROBINSON,
GEORGE O. BRASTOW,
Directors of the Somerville Horse Railway Company.

SUFFOLK, ss. November 1, 1870. Then personally appeared S. E. Sewall, R. E. Demmon and Enoch Robinson, and severally made oath of the truth of the foregoing statement by them subscribed, to their best knowledge and belief.
Before CHARLES E. POWERS, *Justice of the Peace.*

REPORT
OF THE
SOUTH BOSTON RAILWAY COMPANY,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter,		\$450,000 00
2. Capital stock, as voted by the company,	\$450,000 00	
3. Capital stock paid in, expressed in money,	400,000 00	
4. Funded debt,	-	
5. Floating debt, including amount of unredeemed tickets,	13,282 81	
6. Total debt,		13,282 81
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	-	-
8. Number of mortgages on any other property of the corporation, specifying the amounts,	-	-
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	-	-
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$182,869 97	
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	18,016.6 ft.	
12. Length of railway laid with double main track,	7,975.55 ft.	
13. Length of branches owned by the company, stating amount of double track, if any,	-	-
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	2,175.75 ft.	
15. Total length of track measured as single track,	36,143.45 ft.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	} 1,682 ft., 45 lbs.; 23,090.4 ft., 55 lbs.; 11,371.05 ft., 56 lbs.; all wrought iron.	
17. Maximum grade per mile, with length of grade,		355 ft.; 400 ft.
18. Shortest radius of curvature, with length of curve,		33 ft. radius; 46½ ft.
19. Total length of track paved,		All paved.

COST OF EQUIPMENT.

20. Number of cars and cost, [43]	\$42,578 00
21. Number of horses and cost, [280]	40,195 00
22. Cost of omnibuses, sleighs and other vehicles, excepting cars, owned by the company,	20,965 00
23. Cost of real estate, including buildings owned by the company,	90,141 30
24. Cost of buildings owned by the company, on land not owned by the company,	- -
25. Cost of other articles of equipment,	42,142 06
26. Net amount at which the equipment stands charged on the books of the company,	236,021 36

DOINGS DURING THE YEAR.

27. Total number of miles run during the year, [10 mos.,]	502,063.8
28. Average cost per mile run,	33 cents, nearly.
29. Total number of passengers carried in the cars,	3,750,251
30. Total number of round trips run during the year, [10 mos.,]	83,779
31. Average number of passengers each round trip,	44 7-10
32. Rate of speed adopted, including stops and detentions,	5 miles.
33. Number of persons regularly employed, specifying the occupations of each, [1 president, 1 secretary and treasurer, 1 superintendent, 1 clerk, 2 receivers, 37 conductors, 37 drivers, 1 foreman in stable, 2 starters, 6 watchmen and feeders, 21 hostlers, 5 helpers, 3 track repairers, 20 mechanics.]	138

EXPENDITURES FOR WORKING THE RAILWAY.

34. For repairs of railway,	\$18,108 94
35. For repairs of equipments,	9,237 30
36. For repairs of real estate,	1,492 55
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,	68,391 91
38. For interest,	- -
39. For taxes and insurance, other than United States taxes,	1,665 00
40. For United States taxes,	4,892 92
41. For rent and tolls paid other companies for use of their roads,	2,840 95
42. Amount paid other companies for the use of bridges and ferries,	- -
43. For provender,	39,603 57
44. For loss on horses,	3,308 03
45. For incidental expenses, — to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	16,393 57
46. Total expenses,	\$165,934 47

EARNINGS.

47. Received from passengers in cars and omnibuses, and for tickets sold,	\$198,257 80
48. From other roads, as toll or rent for use of road,	- -
49. From other sources, specifying from what source in each item exceeding five hundred dollars, [manure, \$1,530; car advertising, \$1,200,]	2,737 44
50. Total earnings,	\$200,995 24

51. Net earnings, after deducting expenses, . . .	\$35,060 77	
52. Surplus earnings of previous year on hand, . . .	8,115 24	
53. Total surplus,		\$43,176 01
54. Dividends declared during the year, [10 mos.,] . . .	29,473 69	
55. Total percentage of dividends for the year, [exclusive of U. S. tax,]	9½ per cent.	
56. Present surplus,	13,702 32	
MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter,	—	—
58. Increase during the year of capital stock paid in, . . .	—	—
59. Increase of funded debt during the year,	—	—
60. Increase of floating debt during the year,	—	—
61. Decrease of funded debt during the year,	—	—
62. Decrease of floating debt during the year, [10 mos.,] . . .	\$866 00	
63. Increase of mortgage debt during the year,	—	—
64. Decrease of mortgage debt during the year,	—	—
65. Increase in cost of road during the year, [10 mos.,] . . .	1,639 44	
66. Decrease in nominal cost of road,	—	
67. Increase in cost of equipment during the year, [10 mos.,]	5,692 56	
68. Decrease in cost of equipment during the year,	—	
69. Increase of unredeemed tickets during the year,	—	—
70. Decrease of unredeemed tickets during the year, [10 mos.,]	383 00	
71. Present amount of unredeemed tickets,	1,282 81	
72. List of accidents on road during the year, [10 mos.,]	—	—

ACCIDENTS.

December 14, 1869.—A lad, attempting to cross the track just before the horses, fell, and was carried before the wheels a short distance. He was taken up greatly frightened, but little hurt.

December 24.—A man, intoxicated, in leaving car, fell upon the pavement. He subsequently died.

June 18, 1870.—A man got upon the forward end of a car, and after riding a short distance fell off and was hurt.

July 7.—A man jumped from the front platform of car in motion, and was injured.

August 4.—A woman, attempting to leave car in motion with a basket, backwards, fell, and received injury.

August 16.—A woman, leaving car not in motion, fell, and was slightly hurt.

August 31.—A woman in car claimed to be injured by the collision of a car off track going in opposite directions.

September 7.—A man, in getting on car in motion, while incapacitated by drink, fell from forward end of car; the rear wheel passed over his foot, rendering necessary the amputation of some of his toes. He subsequently died.

SETH ADAMS,
E. H. BAKER,
W. B. DODGE,
S. E. WESTCOTT,

Directors of the South Boston Railway Company.

SUFFOLK, ss. November 9, 1870. Then personally appeared Seth Adams, E. H. Baker, W. B. Dodge and S. E. Westcott, a majority of the Directors of the So. Boston R. R. Co., and severally made oath of the truth of the foregoing statement by them subscribed.

Before me,

H. P. HANSON, *Justice of the Peace.*

REPORT
OF THE
SPRINGFIELD RAILWAY COMPANY,
FROM JULY 1, 1870, TO SEPT. 30, INCLUSIVE.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter,		\$100,000 00
2. Capital stock, as voted by the company,	\$50,000 00	
3. Capital stock paid in, expressed in money,	50,000 00	
4. Funded debt,	-	-
5. Floating debt, including amount of unredeemed tickets,	855 26	
	4,400 00	
6. Total debt,		5,255 26
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	-	-
8. Number of mortgages on any other property of the corporation, specifying the amounts,	-	-
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	-	-
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$45,330 87	
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	13,039 feet.	
12. Length of railway laid with double main track,	-	-
13. Length of branches owned by the company, stating amount of double track, if any,	-	-
14. Aggregate length of switches, sidings, turnouts and other track, excepting main track and branches,	1,256 feet.	
15. Total length of track measured as single track,	-	-
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	Wrought, 33 lbs.	
17. Maximum grade per mile, with length of grade,	-	-
18. Shortest radius of curvature, with length of curve,	40 ft. ; 100 ft.	
19. Total length of track paved,	4,800 ft.	
[Total length of track macadamized,]	6,050 ft.	

COST OF EQUIPMENT.		
20. Number of cars and cost, [4]	\$4,590 00	
21. Number of horses and cost, [25]	4,678 90	
22. Cost of omnibuses, sleighs and other vehicles, excepting cars, owned by the company,	1,100 00	
23. Cost of real estate, including buildings owned by the company,	10,805 58	
24. Cost of buildings owned by the company, on land not owned by the company,	-	-
25. Cost of other articles of equipment,	1,342 59	
26. Net amount at which the equipment stands charged on the books of the company,	11,211 49	
DOINGS DURING THE YEAR.		
27. Total number of miles run during the year, [July 1st to Sept. 30th,]		14,848
28. Average cost per mile run,	30 cents.	
29. Total number of passengers carried in the cars,		67,705
30. Total number of round trips run during the year, [July 1st to Sept. 30th,]		3,712
31. Average number of passengers each round trip,	20 3,465-3,712	
32. Rate of speed adopted, including stops and detentions,	5 3-5 miles per hour.	
33. Number of persons regularly employed, specifying the occupations of each, [Superintendent, 1 clerk, 1 watchman, 4 drivers, 4 barn hands, 1 relief man.]	Eleven.	
EXPENDITURES FOR WORKING THE RAILWAY.		
34. For repairs of railway,	}	\$420 43
35. For repairs of equipments,		228 29
36. For repairs of real estate,		
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent and treasurer,		1,665 79
38. For interest,		77 00
39. For taxes and insurance, other than United States taxes,		146 18
40. For United States taxes,		127 46
41. For rent and tolls paid other companies for use of their roads,		-
42. Amount paid other companies for the use of bridges and ferries,		-
43. For provender,		1,361 23
44. For loss on horses,		228 95
45. For incidental expenses,—to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,		200 00
46. Total expenses,		\$4,455 83
EARNINGS.		
47. Received from passengers in cars and omnibuses and for tickets sold,	\$5,380 87	
48. From other roads, as toll or rent for use of road,	-	-
49. From other sources, specifying from what source, in each item exceeding five hundred dollars,	-	-
50. Total earnings,		\$4,525 61
51. Net earnings, after deducting expenses,	-	-
52. Surplus earnings of previous year on hand,	-	-
53. Total surplus,	-	-
54. Dividends declared, during the year,	-	-

55. Total percentage of dividends for the year, .	-	-
56. Present surplus,	-	-
MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter,	-	-
58. Increase during the year of capital stock paid in, .	-	-
59. Increase of funded debt during the year, . .	-	-
60. Increase of floating debt during year, . . .	-	-
61. Decrease of funded debt during the year, . .	-	-
62. Decrease of floating debt during the year, . .	-	-
63. Increase of mortgage debt during the year, . .	-	-
64. Decrease of mortgage debt during the year, . .	-	-
65. Increase in cost of road during the year, . .	-	-
66. Decrease in nominal cost of road,	-	-
67. Increase in cost of equipment during the year, .	-	-
68. Decrease in cost of equipment during the year, .	-	-
69. Increase of unredeemed tickets during the year, .	-	-
70. Decrease of unredeemed tickets during the year, .	-	-
71. Present amount of unredeemed tickets, . .	-	-
72. List of accidents on road during the year, . .	-	-

G. M. ATWATER,
HOMER FOOT,
C. L. COVELL,
GURDON BILL,
Directors of the Springfield Street Railway Company.

HAMPDEN, ss. December 5, 1870. Then personally appeared Geo. M. Atwater, Homer Foot and C. L. Covell, and severally made oath of the truth of the foregoing statement by them subscribed.
Before WM. L. SMITH, *Justice of the Peace.*

HAMPDEN, ss. December 10, 1870. Then personally appeared Gurdon Bill, and made oath of the truth of the foregoing statement by him subscribed.
Before me, E. B. MAYNARD, *Justice of the Peace.*

REPORT
OF THE
STONEHAM RAILWAY COMPANY,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter,		\$50,000 00
2. Capital stock, as voted by the company,	\$33,000 00	
3. Capital stock paid in, expressed in money,	33,000 00	
4. Funded debt,	None.	
5. Floating debt, including amount of unredeemed tickets,	None.	
6. Total debt,	None.	
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	None.	
8. Number of mortgages on any other property of the corporation, specifying the amounts,	None.	
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	408 06	
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$31,000 00	
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	2½ miles.	
12. Length of railway laid with double main track,	None.	
13. Length of branches owned by the company, stating amount of double track, if any,	None.	
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	200 feet.	
15. Total length of track measured as single track,	2½ miles.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	33 lbs., wrought.	
17. Maximum grade per mile, with length of grade,	6-100; length, 100 feet.	
18. Shortest radius of curvature, with length of curve,	120; length, 100 feet.	
19. Total length of track paved,	None.	

COST OF EQUIPMENT.

20. Number of cars, and cost, [5, cost,]	\$4,232 50	
21. Number of horses, and cost, [16, cost,]	3,200 00	
22. Cost of omnibuses, sleighs, and other vehicles, excepting cars, owned by the company,	1,061 94	
23. Cost of real estate, including buildings owned by the company,	1,150 00	
24. Cost of buildings owned by the company, on land not owned by the company,	1,150 00	
25. Cost of other articles of equipment,	-	-
26. Net amount at which the equipment stands charged on the books of the company,	9,044 44	

DOINGS DURING THE YEAR.

27. Total number of miles run during the year,		26,1
28. Average cost per mile run,	38½ cents.	
29. Total number of passengers carried in the cars,		127,817
30. Total number of round trips run during the year,		5,220
31. Average number of passengers each round trip,	24½	
32. Rate of speed adopted, including stops and detentions,	7½ miles.	
33. Number of persons regularly employed, specifying the occupations of each, [2 conductors, 3 drivers, 2 stable men, 1 track repairer.]	8	

EXPENDITURES FOR WORKING THE RAILWAY.

34. For repairs of railway,	\$753 00	
35. For repairs of equipments,	562 50	
36. For repairs of real estate,	37 00	
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,	4,518 12	
38. For interest,	81 82	
39. For taxes and insurance, other than United States taxes,	113 00	
40. For United States taxes,	261 40	
41. For rent and tolls paid other companies for use of their roads,	-	-
42. Amount paid other companies for the use of bridges and ferries,	-	-
43. For provender,	2,583 75	
44. For loss on horses,	200 00	
45. For incidental expenses,—to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	911 07	
46. Total expenses,		\$10,021 66

EARNINGS.

47. Received from passengers in cars and omnibuses, and for tickets sold,	\$11,757 54	
48. From other roads, as toll or rent for use of road,	-	-
49. From other sources, specifying from what source in each item exceeding five hundred dollars,	150 00	
50. Total earnings,		\$11,907 54
51. Net earnings, after deducting expenses,	1,885 88	
52. Surplus earnings of previous year on hand,	-	-
53. Total surplus,		408 06
54. Dividends declared, during the year,	None.	
55. Total percentage of dividends for the year,	-	-
56. Present surplus,	408 06	

MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter,	-	-
58. Increase during the year of capital stock paid in, .	-	-
59. Increase of funded debt during the year, . . .	-	-
60. Increase of floating debt during the year, . . .	-	-
61. Decrease of funded debt during the year, . . .	-	-
62. Decrease of floating debt during the year, . . .	-	-
63. Increase of mortgage debt during the year, . . .	-	-
64. Decrease of mortgage debt during the year, . . .	-	-
65. Increase in cost of road during the year, . . .	-	-
66. Decrease in nominal cost of road,	-	-
67. Increase in cost of equipment, during the year, .	\$600 00	
68. Decrease in cost of equipment during the year, .	-	-
69. Increase of unredeemed tickets during the year, .	-	-
70. Decrease of unredeemed tickets during the year, .	-	-
71. Present amount of unredeemed tickets,	-	-
72. List of accidents on road during the year, . . .	-	-

WM. HURD,
GEO. W. DIKE,
JOHN HILL,
WILLIAM TIDD, JR.,
Directors of the Stoneham Railway Company.

MIDDLESEX, ss. November 1, 1870. Then personally appeared John Hill, Wm. Tidd, Jr., George W. Dike and Wm. Hurd, and severally made oath of the truth of the foregoing statement by them subscribed.

Before
LYMAN DIKE, *Justice of the Peace.*

REPORT
OF THE
UNION RAILWAY COMPANY,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY	
1. Capital stock, fixed by charter,	\$500,000 00
2. Capital stock, as voted by the company,	\$200,000 00
3. Capital stock paid in, expressed in money,	200,000 00
4. Funded debt, [mortgage debt, \$30,200 ; bonds of the Co., \$75,000,]	105,200 00
5. Floating debt, including amount of unredeemed tickets,	48,427 10
6. Total debt,	153,627 10
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	} See Funded Debt.
8. Number of mortgages on any other property of the corporation, specifying the amounts,	
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	
	17,757 49
COST OF THE RAILWAY.	
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	
CHARACTERISTICS OF THE RAILWAY.	
11. Length of railway laid with single main track,	} The Union Railway Co. do not own any tracks in the highways, but lease those of the Cambridge, Arlington and a portion of the Somerville Railroads.
12. Length of railway laid with double main track,	
13. Length of branches owned by the company, stating amount of double track, if any,	
14. Aggregate length of switches, sidings, turnouts and other track, excepting main track and branches,	
15. Total length of track, measured as single track,	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	
17. Maximum grade per mile, with length of grade,	
18. Shortest radius of curvature, with length of curve,	
19. Total length of track paved,	

COST OF EQUIPMENT.		
20. Number of cars, and cost,	[84]	\$52,590 00
21. Number of horses, and cost,	[514]	71,960 00
22. Cost of omnibuses, sleighs, and other vehicles, excepting cars owned by the company,		3,300 00
23. Cost of real estate, including buildings owned by the company,		168,244 56
24. Cost of buildings owned by the company, on land not owned by the company,		15,660 18
25. Cost of other articles of equipment,		38,096 23
26. Net amount at which the equipment stands charged on the books of the company,		349,850 97
DOINGS DURING THE YEAR.		
27. Total number of miles run during the year,		844,295
28. Average cost per mile run, [less rent and interest,]	33 61-100 cents.	
29. Total number of passengers carried in the cars,		4,740,929
30. Total number of round trips run during the year,		108,779
31. Average number of passengers each round trip,	43	
32. Rate of speed adopted, including stops and detentions,	6½ miles per hour.	
33. Number of persons regularly employed, specifying the occupations of each,	272	
[1 president, 1 treasurer, 1 clerk, 1 superintendent, 1 assistant superintendent, 1 clerk to treasurer, 2 receivers, 56 conductors, 59 drivers, 7 switchmen, 1 porter, 3 hill drivers, 1 station agent, 26 road-men, 9 overseers, 8 watchmen, 6 mixers and feeders, 2 hay-cutters, 42 hostlers, 1 harness cleaner, 1 jobber, 2 pumpers, 12 teamsters, 11 blacksmiths, 1 master mechanic, 13 mechanics, 1 painter, 2 harness makers.]		
EXPENDITURES FOR WORKING THE RAILWAY.		
34. For repairs of railway,		\$19,648 62
35. For repairs of equipments,		11,146 11
36. For repairs of real estate,		Nothing.
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent and treasurer,		127,278 60
38. For interest,		7,141 53
39. For taxes and insurance, other than U. S. taxes,		3,932 72
40. For United States taxes,		9,290 62
41. For rent and tolls paid other companies for use of their roads,		59,015 00
42. Amount paid other companies for the use of bridges and ferries,		Nothing.
43. For provender,		68,459 86
44. For loss on horses,		14,420 00
45. For incidental expenses, — to include printing, president's, directors', superintendent's and treasurer's salaries, and all other expenses not herein before included,		29,600 67
46. Total expenses,		\$349,933 73
EARNINGS.		
47. Received from passengers in cars and omnibuses, and for tickets sold,		\$554,195 85
48. From other roads, as toll or rent for use of road,		Nothing.
49. From other sources, specifying from what source in each item exceeding five hundred dollars, [manure, watering, U. S. mails, advertisements and interest,]		12,184 57

50. Total earnings,	\$366,380 42
51. Net earnings, after deducting expenses,	\$16,446 69
52. Surplus earnings of previous year on hand,	9,354 43
53. Total surplus,	25,801 12
54. Dividends declared during the year,	16,000 00
55. Total percentage of dividends for the year,	Eight per centum.
56. Present surplus,	9,801 12
MISCELLANEOUS.	
57. Increase during the year of capital stock, as fixed by charter,	\$200,000 00
58. Increase during the year of capital stock paid in,	Nothing.
59. Increase of funded debt during the year,	} Nothing.
60. Increase of floating debt during the year,	
61. Decrease of funded debt during the year,	Nothing.
62. Decrease of floating debt during the year,	3,431 00
63. Increase of mortgage debt during the year,	} Nothing.
64. Decrease of mortgage debt during the year,	
65. Increase in cost of road during the year,	} The road is not owned by this Company.
66. Decrease in nominal cost of road,	
67. Increase in cost of equipment during the year,	31,421 45
68. Decrease in cost of equipment during the year,	Nothing.
69. Increase of unredeemed tickets during the year,	} Unknown.
70. Decrease of unredeemed tickets during the year,	
71. Present amount of unredeemed tickets,	
72. List of accidents on road during the year,	- -

N. B.—Owing to the change in the time of making the annual report, this Report covers the time from December 1, 1869, to September 30, 1870, both inclusive.

ACCIDENTS.

July 23, 1870.—A man named Hadley fell from the front platform. He was carried to the Mass. Gen'l Hospital, where he afterwards died. The coroner's jury exonerated the Company from all blame.

August 17.—A man named Alexander Flaherty fell from the front platform. He was carried to the Mass. Gen'l Hospital, where he afterwards died. The coroner's jury exonerated the Company from all blame.

K. S. CHAFFEE,
H. H. STIMPSON,
JAMES C. FISK,
SAM'L B. RINDGE,
JOSEPH H. CONVERSE,
ESTES HOWE,
GEO. P. CARTER,
W. A. SAUNDERS,

Directors of the Union Railway Company.

MIDDLESEX, ss. October 31, 1870. Then personally appeared K. S. Chaffee, H. H. Stimpson, James C. Fisk, Sam'l B. Rindge, Joseph H. Converse, Estes Howe, George P. Carter and W. A. Saunders, and severally made oath of the truth of the foregoing statement by them subscribed.

Before

FREDERICK T. STEVENS, Justice of the Peace.

R E P O R T

OF THE

WALTHAM AND NEWTON RAILWAY COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter,		\$30,000 00
2. Capital stock, as voted by the company,	\$22,000 00	
3. Capital stock paid in, expressed in money,	14,750 00	
4. Funded debt,	None.	
5. Floating debt, including amount of unredeemed tickets,	19,049 60	
6. Total debt,		19,049 60
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	None.	
8. Number of mortgages on any other property of the corporation, specifying the amounts,	None.	
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	378 94	
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$24,069 38	
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	13,780½ feet.	
12. Length of railway laid with double main track,	No double track.	
13. Length of branches owned by the company, stating amount of double track, if any,	None.	
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	555 feet.	
15. Total length of track measured as single track,	14,335½ feet.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	11,839 7-10 ft. wrought iron, 25 lbs. to y'd ; 2,283 ft. wrought iron, 33 lbs. to y'd ; 212 ft. cast iron, 75 lbs. to y'd.	
17. Maximum grade per mile, with length of grade,	-	
18. Shortest radius of curvature, with length of curve,	Radius, 55 ft. ; length, 85 ft.	
19. Total length of track paved,	None.	

COST OF EQUIPMENT.

20. Number of cars, and cost, [2]	\$1,900 00
21. Number of horses, and cost, [8]	1,440 00
22. Cost of omnibuses, sleighs and other vehicles, excepting cars, owned by the company,	454 00
23. Cost of real estate, including buildings owned by the company,	None.
24. Cost of buildings owned by the company, on land not owned by the company,	125 00
25. Cost of other articles of equipment,	764 50
26. Net amount at which the equipment stands charged on the books of the company,	2,776 00

DOINGS DURING THE YEAR.

27. Total number of miles run during the year,		26,200
28. Average cost per mile run,	38 cents.	
29. Total number of passengers carried in the cars,		111,014
30. Total number of round trips run during the year,		4,015
31. Average number of passengers each round trip,	27½	
32. Rate of speed adopted, including stops and detentions,	8 min. to mile.	
33. Number of persons regularly employed, specifying the occupations of each, [1-conductor, 2 drivers, 1 superintendent, 1 road master.]	5	

EXPENDITURES FOR WORKING THE RAILWAY.

34. For repairs of railway,	\$2,202 00	
35. For repairs of equipments,	490 00	
36. For repairs of real estate,	None.	
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent and treasurer,	3,502 75	
38. For interest,	None.	
39. For taxes and insurance, other than United States taxes,	None.	
40. For United States taxes,	154 33	
41. For rent and tolls paid other companies for use of their roads,	-	-
42. Amount paid other companies for the use of bridges and ferries,	-	-
43. For provender,	2,329 15	
44. For loss on horses,	-	-
45. For incidental expenses,—to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	1,418 91	
46. Total expenses,		\$10,097 14

EARNINGS.

47. Received from passengers in cars and omnibuses, and for tickets sold,	\$7,887 69	
48. From other roads, as toll or rent for use of road,	-	-
49. From other sources, specifying from what source in each item exceeding five hundred dollars,	-	-
50. Total earnings,		\$7,887 69
51. Net earnings, after deducting expenses,	-	-
52. Surplus earnings of previous year on hand,	-	-
53. Total surplus,	-	-
54. Dividends declared during the year,	-	-
55. Total percentage of dividends for the year,	-	-
56. Present surplus,	-	-

MISCELLANEOUS.	
57. Increase during the year of capital stock, as fixed by charter,	None.
58. Increase during the year of capital stock paid in,	-
59. Increase of funded debt during the year,	-
60. Increase of floating debt during the year,	\$2,399 60
61. Decrease of funded debt during the year,	None.
62. Decrease of floating debt during the year,	-
63. Increase of mortgage debt during the year,	-
64. Decrease of mortgage debt during the year,	-
65. Increase in cost of road during the year,	-
66. Decrease in nominal cost of road,	-
67. Increase in cost of equipment during the year,	-
68. Decrease in cost of equipment during the year,	1,500 00
69. Increase of unredeemed tickets during the year,	None.
70. Decrease of unredeemed tickets during the year,	650 00
71. Present amount of unredeemed tickets,	38 70
72. List of accidents on road during the year,	None.

R. E. ROBBINS,
HENRY MARTYN,
THOS. KIRKE,
JOSIAH HASTINGS,
W. R. HORTON,
Directors of the Waltham and Newton Railway Company.

MIDDLESEX, ss. November 21, 1870. Then personally appeared Henry Martyn and Thomas Kirke, and severally made oath of the truth of the foregoing statements by them subscribed.

Before DANIEL FRENCH, *Justice of the Peace.*

REPORT

OF THE

WINNISIMMET RAILWAY COMPANY,

FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.	
1. Capital stock, fixed by charter,	\$75,000 00
2. Capital stock, as voted by the company,	\$75,000 00
3. Capital stock paid in, expressed in money, [was, in 1869, \$54,750 00,] [Reduced, 1870, 1,850 00,]	} 52,900 00
4. Funded debt,	Nothing.
5. Floating debt, including amount of unredeemed tickets,	None.
6. Total debt,	None.
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	None.
8. Number of mortgages on any other property of the corporation, specifying the amounts,	None.
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair, [cash,]	12 60
COST OF THE RAILWAY.	
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$62,151 74
CHARACTERISTICS OF THE RAILWAY.	
11. Length of railway laid with single main track,	2½ miles.
12. Length of railway laid with double main track,	None.
13. Length of branches owned by the company, stating amount of double track, if any,	None.
14. Aggregate length of switches, sidings, turnouts and other track, excepting main track and branches,	2,640 feet.
15. Total length of track measured as single track,	2¾ miles.
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	45 lbs. per yard, rolled iron.
17. Maximum grade per mile, with length of grade,	—
18. Shortest radius of curvature, with length of curve,	50 feet; 70 feet long.
19. Total length of track paved,	4,000 feet.

COST OF EQUIPMENT.		
20. Number of cars, and cost,		
21. Number of horses, and cost,		
22. Cost of omnibuses, sleighs, and other vehicles, excepting cars, owned by the company,		
23. Cost of real estate, including buildings owned by the company,		
24. Cost of buildings owned by the company, on land not owned by the company,		
25. Cost of other articles of equipment,		
26. Net amount at which the equipment stands charged on the books of the company,		
DOINGS DURING THE YEAR.		
27. Total number of miles run during the year,		
28. Average cost per mile run,		
29. Total number of passengers carried in the cars,		
30. Total number of round trips run during the year,		
31. Average number of passengers each round trip,		
32. Rate of speed adopted, including stops and detentions,		
33. Number of persons regularly employed, specifying the occupations of each,		
EXPENDITURES FOR WORKING THE RAILWAY.		
34. For repairs of railway,		
35. For repairs of equipments,		
36. For repairs of real estate,		
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,		
38. For interest,		
39. For taxes and insurance, other than United States taxes,		
40. For United States taxes,		
41. For rent and tolls paid other companies for use of their roads,		
42. Amount paid other companies for the use of bridges and ferries,		
43. For provender,		
44. For loss on horses,		
45. For incidental expenses, — to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,		
46. Total expenses,		
EARNINGS.		
47. Received from passengers in cars and omnibuses, and for tickets sold,		
48. From other roads, as toll or rent for use of road,		
49. From other sources, specifying from what source in each item exceeding five hundred dollars,		
50. Total earnings,		
51. Net earnings, after deducting expenses,		
52. Surplus earnings of previous year on hand,		
53. Total surplus,		
54. Dividends declared during the year,		
55. Total percentage of dividends for the year,		
56. Present surplus,*		

* N. B.—By vote of the stockholders, the surplus of past and present years has been used in reducing the capital stock.

MISCELLANEOUS.		
57. Increase during the year of capital stock, as fixed by charter,		} Nothing.
58. Increase during the year of capital stock paid in,		
59. Increase of funded debt during the year,		
60. Increase of floating debt during the year,		
61. Decrease of funded debt during the year,		} \$626 00
62. Decrease of floating debt during the year,		
63. Increase of mortgage debt during the year,		} None.
64. Decrease of mortgage debt during the year,		
65. Increase in cost of road during the year,		
66. Decrease in nominal cost of road,		
67. Increase in cost of equipment during the year,		} None.
68. Decrease in cost of equipment during the year,		
69. Increase of unredeemed tickets during the year,		
70. Decrease of unredeemed tickets during the year,		
71. Present amount of unredeemed tickets,		
72. List of accidents on road during the year,		

WM. R. PEARMAIN,
JOHN BUCK,
ERASTUS RUGG,

Directors of the Winnisimmet Street Railway Company.

SUFFOLK, ss. October 31, 1870. Then personally appeared William R. Pearmain, John Buck and Erastus Rugg, and severally made oath of the truth of the foregoing statement by them subscribed.

Before

RALPH BEATLEY, *Justice of the Peace.*

REPORT
OF THE
WORCESTER RAILWAY COMPANY,
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter,		\$100,000 00
2. Capital stock, as voted by the company,	\$40,000 00	
3. Capital stock paid in, expressed in money,	40,000 00	
4. Funded debt, [bonds,]	20,000 00	
5. Floating debt, including amount of unredeemed tickets,	8,086 44	
6. Total debt,		28,086 44
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	20,000 00	
8. Number of mortgages on any other property of the corporation, specifying the amounts,	13,000 00	
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair, [cash in bank,]	848 53	
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	\$15,706 00	
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	16,020 feet.	
12. Length of railway laid with double main track,	—	—
13. Length of branches owned by the company, stating amount of double track, if any,	2,598 feet.	
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	1,855 feet.	
15. Total length of track, measured as single track,	20,473 feet.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron, [wrought,]	45 lbs to yard.	
17. Maximum grade per mile, with length of grade,	—	—
18. Shortest radius of curvature, with length of curve,	—	—
19. Total length of track paved,	20,473 feet.	

COST OF EQUIPMENT.

20. Number of cars and cost, [16]	\$17,600 00
21. Number of horses and cost, [40]	7,094 50
22. Cost of omnibuses, sleighs, and other vehicles, excepting cars, owned by the company,	4,888 02
23. Cost of real estate, including buildings owned by the company,	20,307 42
24. Cost of buildings owned by the company, on land not owned by the company,	None.
25. Cost of other articles of equipment,	1,416 33
26. Net amount at which the equipment stands charged on the books of the company,	30,498 85

DOINGS DURING THE YEAR.

27. Total number of miles run during the year, [since November 18, 1869,]	62,284
28. Average cost per mile run, [since Nov. 18, 1869,]	31½
29. Total number of passengers carried in the cars, [since November 18, 1869,]	304,165
30. Total number of round trips run during the year, [since November 18, 1869,]	12,891
31. Average number of passengers each round trip, [since November 18, 1869,]	23 51-100
32. Rate of speed adopted, including stops and detentions, [since November 18, 1869,]	6 miles per hour.
33. Number of persons regularly employed, (specifying the occupations of each,) [Superintendent, 1 repairer, 4 stable men, 6 drivers, 1 blacksmith, 1 watchman, 2 roadmen.]	16

EXPENDITURES FOR WORKING THE RAILWAY.

34. For repairs of railway,	-	-
35. For repairs of equipments,	-	-
36. For repairs of real estate,	-	-
37. For wages, including the wages of every person regularly employed, excepting the president, directors, superintendent, and treasurer,	\$9,748 69	
38. For interest,	1,203 19	
39. For taxes and insurance, other than United States taxes,	200 00	
40. For United States taxes,	355 02	
41. For rent and tolls paid other companies for use of their roads,	None.	
42. Amount paid other companies for the use of bridges and ferries,	None.	
43. For provender,	5,617 45	
44. For loss on horses,	None.	
45. For incidental expenses, — to include printing, president's, directors', superintendent's, and treasurer's salaries, and all other expenses not herein before included,	2,669 06	
46. Total expenses,		\$19,793 41

EARNINGS.

47. Received from passengers in cars and omnibuses, and for tickets sold,	\$17,337 22	
48. From other roads, as toll or rent for use of road,	-	-
49. From other sources, specifying from what source in each item, exceeding five hundred dollars,	150 00	
50. Total earnings,		\$17,487 22
51. Net earnings, after deducting expenses,	None.	

52. Surplus earnings of previous year on hand,	None.
53. Total surplus,	None.
54. Dividends declared during the year,	None.
55. Total percentage of dividends for the year,	None.
56. Present surplus,	None.
MISCELLANEOUS.	
57. Increase during the year of capital stock, as fixed by charter,	None.
58. Increase during the year of capital stock paid in,	None.
59. Increase of funded debt during the year,	None.
60. Increase of floating debt during the year,	\$8,636 39
61. Decrease of funded debt during the year,	None.
62. Decrease of floating debt during the year,	None.
63. Increase of mortgage debt during the year,	None.
64. Decrease of mortgage debt during the year,	None.
65. Increase in cost of road during the year,	None.
66. Decrease in nominal cost of road,	None.
67. Increase in cost of equipment during the year,	None.
68. Decrease in cost of equipment during the year,	None.
69. Increase of unredeemed tickets during the year,	7,051 00
70. Decrease of unredeemed tickets during the year,	7,051 00
71. Present amount of unredeemed tickets,	None.
72. List of accidents on road during the year,	None.

G. I. STEVENS,
AUGUSTUS SEELEY,
GEO. H. SEELEY,
NATHAN SEELEY,

Directors of the Worcester Street Railway Company.

STATE OF NEW YORK.

CITY AND COUNTY OF NEW YORK, ss. Be it remembered, That on the 29th day of October, in the year one thousand eight hundred and seventy, before me the undersigned, Henry C. Banks, a Commissioner resident in the city of New York, duly commissioned and qualified by the executive authority, and under the laws of the State of Massachusetts, to take the acknowledgment and proof of deeds, etc., to be used or recorded therein, personally appeared George I. Stevens, Augustus Seeley, George H. Seeley and Nathan Seeley, to me known to be the individuals named in and who executed the foregoing instrument, and severally acknowledged the same to be their free act and deed before me.

In witness whereof, I have hereunto set my hand and affixed my official seal the day and and year aforesaid.

HENRY C. BANKS, *Commissioner for Massachusetts,*

No. 3 John Street, New York.

REPORT
OF THE
BOSTON AND WEST ROXBURY RAILWAY COMPANY
FOR THE TEN MONTHS ENDING SEPTEMBER 30, 1870.

CONDITION OF THE COMPANY.		
1. Capital stock, fixed by charter, [not exceeding]		\$180,000 00
2. Capital stock, as voted by the company,	\$41,000 00	
3. Capital stock paid in, expressed in money,	41,000 00	
4. Funded debt,	None.	
5. Floating debt, including amount of unredeemed tickets,	None.	
6. Total debt,	None.	
7. Number of mortgages on road and franchise, and amount of debt secured thereby,	None.	
8. Number of mortgages on any other property of the corporation, specifying the amounts,	None.	
9. Amounts of assets on hand, exclusive of the railway and equipments, and exclusive of all property on hand, used, or which is to be used, in running the railway and keeping it in repair,	None.	
COST OF THE RAILWAY.		
10. Net cost of road,—to include all amounts expended for labor, timber, iron or rails, and chairs, for paving-stones and paving, engineering, interest, salaries of officers during construction of road, and other expenses not included in any of the above items, and not including items of equipment, or running expenses,	-	-
CHARACTERISTICS OF THE RAILWAY.		
11. Length of railway laid with single main track,	2½ miles.	
12. Length of railway laid with double main track,	None.	
13. Length of branches owned by the company, stating amount of double track, if any,	None.	
14. Aggregate length of switches, sidings, turnouts, and other track, excepting main track and branches,	About 300 feet.	
15. Total length of track measured as single track,	2½ miles.	
16. Weight of rail used, per yard, and length of track laid with each kind of rail, specifying whether of cast or wrought iron,	} 83 lbs. per yard, wrought iron.	
17. Maximum grade per mile, with length of grade,		-
18. Shortest radius of curvature, with length of curve,		-
19. Total length of track paved,		-

324 BOSTON & W. ROXBURY [ST.] RAILWAY. [Jan.'71.

COST OF EQUIPMENT.	
20. Number of cars and cost,	} Road not in operation, save that part run by the Metropolitan R. R. Co.
21. Number of horses and cost,	
22. Cost of omnibuses, sleighs and other vehicles, excepting cars, owned by the company,	
23. Cost of real estate, including buildings owned by the company,	
24. Cost of buildings owned by the company, on land not owned by the company,	
25. Cost of other articles of equipment,	
26. Net amount at which the equipment stands charged on the books of the company,	
DOINGS DURING THE YEAR.	
27. Total number of miles run during the year,	} See above.
28. Average cost per mile run,	
29. Total number of passengers carried in the cars,	
30. Total number of round trips run during the year,	
31. Average number of passengers each round trip,	
32. Rate of speed adopted, including stops and detentions,	
33. Number of persons regularly employed, specifying the occupations of each,	

NOTE.—No part of the road is operated by the Boston and West Roxbury R. R. Co. The only portion used is the easterly end, between the West Roxbury line and Forest Hill station, on the Boston and Providence R. R., which is run by the Metropolitan R. R. Co.

B. W. THAYER,
JOHN PEARCE,
JAMES W. ROLLINS,
Directors of the Boston and West Roxbury Railway Company.

SUFFOLK, ss. December 14, 1870. Then personally appeared Benj. W. Thayer John Pearce and James W. Rollins, and severally made oath of the truth of the foregoing statement by them subscribed.
Before CARROLL D. WRIGHT, *Justice of the Peace.*

A B S T R A C T S

OF THE PRECEDING

Railroad and Street Railway Reports,

FOR THE TEN MONTHS ENDING

September 30, 1870.

* C

Spe
of Pass
Trains,
per h

25
32

30
32
30

28
29
22
25
30

-
-
-
28
-

26
24
27
20
33

-
-
-
-
25

-
30
30
-

25
23
30
33

-
30
-
20
22
20

18
23
23
20
30

† Fo

† L

Speed of Passenger Trains, miles per hour.	Amount of Dividends.	Surplus.	CASUALTIES.	
			Fatal.	Not Fatal.
-	-	-	-	-
25	\$33,293 20	-	-	-
32	863,189 45	\$2,390,505 59	44	-
-	-	-	-	-
30	3,600 00	30,842 35	1	-
35	-	-	-	-
30	88,600 00	748,876 05	7	6
28	239,601 60	1,212,369 43	22	8
29	185,000 00	504,422 06	6	1
22	33,999 00	16,498 43	-	-
25	*44,210 53	103,754 41	3	1
30	170,000 00	216,110 08	2	1
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
28	383,523 74	180,542 52	11	1
-	-	-	-	-
26	-	-	-	-
24	-	-	-	-
27½	298,105 30	501,230 63	6	4
20	-	-	-	-
33	459,883 75	-	-	-
-	-	-	-	-
-	12,000 00	15,132 77	2	1
-	-	-	-	-
-	-	-	-	-
25	2,944 00	11,770 03	-	-
-	-	-	-	-
-	-	-	-	-
30	36,000 00	126,747 42	1	-
30	40,000 00	124,078 42	-	-
-	-	-	-	-
25	-	-	3	1
23	34,300 00	-	-	-
30	214,693 57	227,016 91	-	-
33	156,600 00	418,269 42	7	2
-	\$13,500 00	-	-	-
30	100,000 00	117,698 38	7	6
-	3,406 20	-	1	1
20	-	-	-	-
22	-	24,807 33	-	-
20	24,836 40	-	-	-
-	8,019 00	634 41	-	2
18	2,562 00	2,846 33	-	-
25	10,508 81	76,428 97	-	-
25	-	-	-	-
-	-	-	-	-
25	1,386 00	649 75	-	-
35	77,500 00	170,078 80	4	-
-	1,571,262 55	\$7,230,310 49	127	30

† For notes 1 Massachusetts.

†† Including Boston and Albany R. R. Report.

SEPTEMBER 30, 1870.

Some.	Per cent. of Dividends.	Amount of Dividends.	Surplus.	CASUALTIES.	
				Fatal.	Not Fatal.
56 86	-	-	\$682 87	-	-
-	-	-	-	-	-
103 92	4 for 6 mos.	\$4,400 00	80 87	-	-
-	-	-	-	-	-
130 63	-	-	8,752 44	-	1
-	-	-	5,321 46	1	6
-	-	-	-	-	-
-	-	-	-	-	-
380 75	-	-	287 48	-	-
-	-	-	-	-	-
518 41	10 per cent.	125,000 00	45,742 33	6	2
394 53	8 per cent.	12,000 00	22,224 89	-	-
-	-	-	-	-	-
920 00	-	-	-	-	-
-	-	-	2,540 23	2	-
500 00	6 per cent.	4,500 00	-	-	-
1060 77	9½ per cent.	29,478 69	13,702 32	2	6
70 20	-	-	-	-	-
108 06	-	-	408 06	-	-
146 69	8 per cent.	16,000 00	9,801 12	2	-
-	-	-	-	-	-
1010 96	4 per cent.	2,305 24	705 72	-	-
-	-	-	-	-	-
701 78		\$193,678 93	\$105,249 79	13	15

** For six months.

any. e Operated by Middlesex and Union Railroad Companies.

The South Reading Branch Railroad is operated by the Eastern Railroad Company.

The Stony Brook Railroad is operated by the Nashua and Lowell Railroad Company.

The Stoughton Branch Railroad is operated by the Boston and Providence Railroad Company.

NOTE.—Wherever the returns are made in conformity with the blank form provided by law (every description of Taxes being reported under No. 127, and Interest paid under No. 137), the Net Income and Dividends of this abstract will agree with the printed report of the company—and not otherwise.

APPENDIX.

THIS INDENTURE

Made this first day of January, A. D. 1870, by and between the Mansfield and Framingham Railroad Company, party of the first part, and the Boston, Clinton and Fitchburg Railroad Company, party of the second part,

WITNESSETH:

That the said party of the first part doth hereby lease, demise and let to the party of the second part the railroad of said party of the first part, extending from Mansfield, in the county of Bristol, to the Boston, Clinton and Fitchburg Railroad in Framingham, in the county of Middlesex, with all the lands contained within the location of said railroad, and the depots and other buildings thereto belonging, and all the lands appurtenant thereto or needful for the convenient use thereof, together with all the rights, privileges, easements, appurtenances and franchises thereto belonging or which may during the term hereof be acquired by said party of the first part.

To have and to hold the same to the said party of the second part, with the sole and exclusive right to hold, use and enjoy the same, and to run and operate the said railroad of said party of the first part for and during the term of twenty years from the day of the date hereof, upon the terms and conditions hereinafter set forth in the covenants of said party of the second part.

And the party of the first part doth further covenant and agree with said party of the second part during the term hereof to perform all statute requirements and legal obligations incumbent upon the said party of the first part for the preservation of its charter and franchise, and for the use and enjoyment thereof by the party of the second part, and that no part of the demised premises shall be in any way taken or interfered with by reason of any indebtedness or liability of said party of the first part during the term hereof.

The said party of the second part in consideration of the premises, covenants and agrees with said party of the first part to stock and equip with a proper and sufficient amount of rolling stock the said railroad hereby demised, and to run and operate the said railroad during the term of this lease in such manner as shall be reasonable and proper for a railroad of its class and description, and for the business upon its route, running such through and local trains, not less than two daily trains each way, as may be found needful for the reasonable accommodation of the public.

That they will pay all the expenses of running said trains, and of the maintenance and care of depots, and all taxes and internal revenue duties upon the demised premises, and upon the earnings and business of said railroad, and of all repairs and renewals upon said road and its equipment, and all damages for which said party of the first part shall in any way become liable for loss of life or property, or injury to person or property incurred in the running of said railroad by said party of the second part; and that they will keep said railroad and demised premises in good order and condition during said term, and surrender

the same in as good order and condition, reasonable use, wear and decay thereof excepted, as the same shall have been received by them, and with the rails and sleepers in as good average condition, at the end of said term as the same shall at the same date be, in and upon the other roads of like character and class in Massachusetts : *provided, however*, that nothing herein contained shall be taken to oblige the said party of the second part to replace any iron which shall be worn out, with rails weighing more than fifty pounds to the yard, being the weight of the rail now on said road.

The said party of the second part further covenants and agrees with said party of the first part to keep at all times, full, just and true accounts of all the receipts and earnings by them derived from the running of said railroad, and to pay over semi-annually to the said party of the first part, as rent for the demised premises, one-fourth part of the gross earnings thereof; and that such semi-annual payments shall in no event fall below the sum of twelve thousand five hundred dollars: *provided, however*, that whenever for the space of any one term of six months, one-fourth of the gross earnings shall fall below said sum of twelve thousand five hundred dollars after making the deductions for permanent improvements as below set forth, and the deficiency shall be made up by said party of the second part, they shall have the right to reserve out of the surplus earnings of any subsequent six months a sufficient sum to reimburse them for the amount of such deficiency so made up with interest thereon at seven per cent. per annum.

And in estimating the gross earnings of said railroad under this agreement, it is agreed that all joint business of the two railroads of the parties hereto shall be divided *pro rata* according to the number of miles for which the passengers or freight shall be carried in such joint business.

It is further agreed that the party of the second part shall have the right to make any needful additions and permanent improvements in said railroad, its construction, superstructure, depots and appurtenances during said term, and to deduct the amounts which shall be expended thereon out of the rent to be paid as aforesaid, provided the same shall not thereby be reduced below the sum of twelve thousand five hundred dollars semi-annually.

It is further understood and agreed that the entire rolling-stock and equipment furnished by said party of the second part, are and shall remain at all times the property of said party of the second part, and may be removed by them at the determination of this lease.

In case any difference shall arise as to the construction or effect of any stipulation herein contained, or as to any obligation or liability of either party to the other under this indenture, or any claim arising under the same, the same shall be submitted to the arbitration of three persons who shall be mutually agreed upon by each of the parties hereto, and their award shall be final in the premises.

In testimony whereof the said Mansfield and Framingham Railroad Company, by Erastus P. Carpenter, President, and Hosea Hyde, Treasurer, and the said Boston, Clinton and Fitchburg Railroad Company, by Lyman Nichols, President, and Henry F. Coggsall, Treasurer, have hereto set their respective seals, and said Carpenter, Hyde, Nichols and Coggsall have signed their names this twentieth day of June, A. D. 1870.

MANSFIELD AND FRAMINGHAM RAILROAD,

By E. P. CARPENTER, *President*.

HOSEA HYDE, *Treasurer*.

[SEAL.]

Attest: H. A. BLOOD.

BOSTON, CLINTON AND FITCHBURG RAILROAD,

By LYMAN NICHOLS, *President*.

H. F. COGGSALL, *Treasurer*.

[SEAL.]

Attest: S. W. HUNTLEY.

A true copy. Attest:

S. W. HUNTLEY.

Commonwealth of Massachusetts.

AGGREGATES

OF

POLLS, PROPERTY, TAXES, &c.,

AS

ASSESSED MAY 1, 1870.

COMPILED

BY OLIVER WARNER,

SECRETARY OF THE COMMONWEALTH.

BOSTON:

WRIGHT & POTTER, STATE PRINTERS,

79 MILK STREET (CORNER OF FEDERAL).

1871.

Commonwealth of Massachusetts.

SECRETARY'S DEPARTMENT, BOSTON, }
December, 1870. }

To the Honorable Senate and House of Representatives.

In accordance with the provisions of section 4, chapter 167 of the Acts of 1861, I respectfully submit for the use of the Legislature, the Tenth Annual Abstract, containing the Aggregates of Polls, Property, Taxes, &c., as assessed May 1, 1870. By the returns of the assessors, it appears that over seventy-five million dollars have been added to the taxable property of the Commonwealth since the previous report; and during the decade the present year marks since this system of statistics was adopted, the valuation of the Commonwealth has grown from eight hundred sixty-one million five hundred forty-seven thousand five hundred eighty-three dollars (\$861,547,583) to fourteen hundred seventeen million one hundred twenty-seven thousand three hundred seventy-six dollars (\$1,417,127,376), being an increase of five hundred fifty-five million five hundred seventy-nine thousand seven hundred ninety-three dollars (\$555,579,793), or sixty-four per cent. The island counties have gradually decreased their valuation during this period, while the other counties have shown a steady increase. These returns are now much sought after by persons having to do with real estate, and are looked upon as authority in such matters. The design of the law which originated them was undoubtedly to obviate the necessity of a valuation committee each decade, or half decade, as the returns would seem to present the necessary items on which to base and apportion the rate of tax. The amount raised for the purposes of taxation, throughout the State, for the past year was nearly twenty-two million dollars.

Very respectfully,

OLIVER WARNER, *Secretary.*

AGGREGATES OF POLLS, PROPERTY, TAXES, &c., AS ASSESSED MAY 1, 1870.

4

POLLS, PROPERTY, TAXES, &c.

[Jan.

COUNTIES AND TOWNS.	Total number of Polls.	Total Tax on Polls.	Total Value of Personal Estate.	Total Value of Real Estate.	Total Tax for State, County, City and Town purposes, including Highway Tax.	Rate of Total Tax, per \$100.	Total Valuation, May 1, 1870.	Total number of Dwelling-houses.	Total number of Horses.	Total number of Cows.	Total number of Sheep.	Total number of Acres of Land taxed in the City or Town.
BARNSTABLE.												
Barnstable, .	1,158	\$2,316 00	\$1,290,150	\$1,866,950	\$28,887 00	\$1 00	\$2,657,100	879	398	565	273	23,741
Brewster, .	309	686 00	404,099	343,750	10,408 00	1 30	747,849	273	124	230	25	8,160
Chatham, .	579	1,158 00	461,633	545,809	16,996 00	1 43	1,007,442	570	150	230	1	7,230
Dennis, .	845	1,690 00	893,738	584,466	19,426 00	1 20	1,478,204	657	175	270	64	7,135
Eastham, .	178	356 00	83,200	136,988	5,210 00	2 20	220,188	166	112	168	-	4,899
Falmouth, .	690	1,380 00	490,885	718,827	16,026 00	1 21	1,209,712	352	208	396	330	20,229
Harwich, .	813	1,626 00	343,455	696,445	25,172 00	2 25	1,039,900	723	195	246	17	9,686
Mashpee, .	71	66 00	6,612	81,619	400 00	38	88,231	62	25	35	44	8,000
Orleans, .	408	947 00	218,035	302,586	11,426 00	2 00	520,621	333	174	248	8	5,000
Provincetown, .	1,073	2,146 00	1,126,398	854,763	39,623 00	2 00	1,981,161	805	68	27	-	665
Sandwich, .	812	1,624 00	370,050	1,035,050	27,197 00	1 82	1,405,100	761	270	485	300	45,400
Truro, .	854	708 00	107,192	183,914	8,568 00	2 94	291,106	260	86	221	-	7,984
Wellfleet, .	577	1,154 00	440,433	372,410	17,266 00	1 96	812,849	440	124	207	-	4,400
Yarmouth, .	578	1,156 00	837,167	574,850	16,025 00	1 05	1,412,017	467	173	212	16	10,098
Totals, .	8,446	\$17,013 00	\$7,073,047	\$7,798,483	\$242,640 00	-	\$14,571,480	6,748	2,282	8,540	1,078	162,627.

Aggregates of Polls, Property, Taxes, &c., as assessed May 1, 1870.—Continued.

COUNTIES AND TOWNS.	Total number of Polls.	Total Tax on Polls.	Total Value of Personal Estate.	Total Value of Real Estate.	Total Tax for State, County, City and Town purposes, including Highway Tax.	Rate of Total Tax, per \$100.	Total Valuation, May 1, 1870.	Total number of Dwelling-houses.	Total number of Horses.	Total number of Cows.	Total number of Sheep.	Total number of Acres of Land taxed in the City or Town.
BRKS.—Con.												
Pittsfield, .	2,327	\$4,654 00	\$3,563,400	\$5,081,438	\$112,717 00	\$1 25	\$8,644,838	1,584	1,021	1,225	1,304	23,599
Richmond, .	298	596 00	89,036	461,689	5,482 00	75	550,725	193	196	351	2,350	11,363
Sandisfield, .	351	955 00	191,703	399,141	8,633 00	1 46	590,844	286	276	1,129	430	28,541
Savoy, .	202	606 00	68,832	208,551	5,778 00	1 86	277,383	182	210	508	546	21,267
Sheffield, .	619	1,238 00	420,050	971,010	19,322 00	1 30	1,391,060	500	570	1,689	1,230	31,275
Stockbridge, .	455	910 00	1,072,605	991,095	14,107 00	64	2,063,700	385	313	636	1,145	13,614
Tyringham, .	143	429 00	68,702	218,298	4,504 00	1 42	287,000	109	82	382	321	10,854
Washington, .	156	513 00	45,039	233,460	4,341 00	1 41	278,499	130	101	349	772	22,724
W. Stockbridge, .	543	1,352 00	301,428	650,271	11,257 00	1 04	951,699	358	311	398	1,911	11,103
Williamstown, .	668	1,770 00	450,584	1,241,407	23,428 00	1 28	1,691,991	513	420	1,136	2,877	27,228
Windsor, .	188	376 00	78,982	218,761	6,510 00	1 70	297,743	158	190	632	706	21,214
Totals, .	14,829	\$31,991 00	\$14,153,663	\$22,975,256	\$485,439 00	-	\$37,128,919	10,181	8,469	19,578	28,646	541,969
BRISTOL.												
Acushnet, .	278	\$556 00	\$219,150	\$459,900	\$10,068 00	\$1 40	\$679,050	242	208	379	12	10,994
Attleborough, .	1,775	8,550 00	821,159	1,924,556	38,642 00	1 12	2,745,715	1,007	622	871	24	25,591

1871.]

PUBLIC DOCUMENT—No. 36.

7

Berkley, .	204	\$612 00	\$69,844	\$258,457	\$4,659 00	\$1 34	\$328,301	174	136	236	166	8,105
Dartmouth, .	812	1,624 00	847,150	1,440,500	29,932 00	1 15	2,287,650	748	464	867	327	36,072
Dighton, .	485	970 00	219,464	585,989	18,462 00	1 56	805,453	315	218	262	109	12,759
Easton, .	1,001	2,052 00	1,306,307	967,971	12,536 00	46	2,274,278	682	290	395	45	16,011
Fairhaven, .	671	1,342 00	638,800	960,400	23,661 00	1 40	1,594,200	511	160	226	23	6,000
Fall River, .	6,743	13,486 00	10,040,472	13,571,742	374,753 00	1 53	23,612,214	2,297	1,016	702	180	18,174
Freetown, .	330	660 00	271,827	485,585	8,992 00	1 10	757,412	292	157	234	269	20,940
Mansfield, .	573	1,146 00	170,982	672,308	13,190 00	1 43	843,290	410	225	334	10	10,964
New Bedford, .	5,151	10,302 00	14,221,514	8,774,500	366,740 00	1 55	22,996,014	3,216	964	550	-	8,451
Norton, .	415	1,162 00	212,600	596,125	11,840 00	1 32	808,725	348	231	356	90	16,749
Raynham, .	444	1,221 00	384,417	682,577	12,337 00	1 04	1,066,994	357	203	342	74	11,041
Rehoboth, .	438	876 00	178,058	663,054	12,782 00	1 45	841,112	356	350	674	169	24,900
Seekonk, .	250	500 00	142,036	483,356	6,762 00	1 00	625,392	205	197	424	15	11,049
Somerset, .	464	928 00	298,891	637,896	12,300 00	1 22	936,792	287	140	242	15	4,800
Swansey, .	312	624 00	158,700	491,450	12,642 00	1 80	650,150	268	241	417	351	12,832
Taunton, .	4,771	9,542 00	5,684,967	9,317,132	203,070 00	1 29	15,002,099	2,511	1,173	803	150	25,989
Westport, .	632	1,264 00	558,600	1,012,350	20,683 00	1 21	1,570,950	621	413	820	722	28,152
Totals, .	25,749	\$52,417 00	\$36,439,943	\$43,985,848	1,184,046 00	-	\$80,425,791	14,792	7,408	9,134	2,751	309,573

Aggregates of Polls, Property, Taxes, &c., as assessed May 1, 1870—Continued.

COUNTIES AND TOWNS.	Total number of Polls.	Total Tax on Polls.	Total Value of Personal Estate.	Total Value of Real Estate.	Total Tax for State, County, City and Town purposes, including Highway Tax.	Rate of Total Tax, per \$100.	Total Valuation, May 1, 1870.	Total number of Dwelling-houses.	Total number of Horses.	Total number of Cows.	Total number of Sheep.	Total number of Acres of Land taxed in the City or Town.
DUKES.												
Chilmark, .	152	\$304 00	\$100,884	\$216,924	\$6,212 00	\$1 71	\$317,808	117	87	185	3,240	10,153
Edgartown, .	446	892 00	395,000	700,800	14,480 00	1 24	1,095,800	638	109	215	1,313	15,453
Gay Head,*	-	-	-	-	-	-	-	-	-	-	-	-
Gosnold, .	24	86 00	64,444	95,499	719 00	41	159,943	29	32	61	8,414	8,301
Tisbury, .	445	890 00	208,646	448,540	14,403 00	2 62	657,186	335	143	200	1,624	11,850
Totals, .	1,067	\$2,122 00	\$768,974	\$1,461,763	\$35,814 00	-	\$2,230,737	1,119	371	661	9,591	45,757
Essex.												
Amesbury, .	1,602	\$3,204 00	\$668,972	\$1,554,010	\$33,345 00	\$1 50	\$2,222,982	828	348	402	161	9,108
Andover, .	1,050	2,100 00	853,348	1,684,440	38,282 00	1 25	2,537,788	740	371	806	19	18,118
Beverly, .	1,597	3,194 00	2,610,800	2,952,250	73,288 00	1 26	5,563,050	1,020	415	592	22	7,629
Boxford, .	224	448 00	271,240	534,290	8,952 00	1 06	805,530	173	143	348	140	14,112
Bradford, .	496	1,240 00	208,818	873,450	18,187 00	1 57	1,082,268	289	163	331	10	4,443
Danvers, .	1,306	2,612 00	1,002,500	1,747,400	42,211 00	1 44	2,749,900	840	464	663	38	7,620
Essex, .	424	848 00	872,121	568,458	16,106 00	1 61	940,579	316	169	332	10	7,835
Georgetown, .	503	1,323 00	252,735	604,670	17,186 00	1 85	857,405	375	181	295	55	7,543

1871.]

PUBLIC DOCUMENT—No. 36.

9

Gloucester, . .	8,100	\$6,200 00	\$3,110,493	\$4,076,614	\$153,586 00	\$2 25	\$7,187,107	1,933	418	470	-	9,986
Groveland, . .	473	1,116 00	195,465	560,643	11,864 00	1 42	756,108	290	148	166	6	5,231
Hamilton, . .	195	390 00	106,945	369,547	7,865 00	1 54	476,492	158	146	341	77	8,114
Haverhill, . .	4,281	12,586 00	2,795,900	5,913,750	224,443 00	2 43	8,709,650	1,815	883	1,061	88	14,590
Ipswich, . .	786	1,572 00	506,607	1,125,841	22,758 00	1 45	1,632,448	359	317	588	30	15,903
Lawrence, . .	6,506	13,012 00	5,848,240	12,064,267	321,107 00	1 72	17,912,507	3,223	865	156	-	3,210
Lynn, . .	6,773	13,546 00	6,649,903	14,277,212	373,492 00	1 72	20,927,115	4,186	810	324	40	4,318
Lynnfield, . .	212	424 00	260,578	434,064	6,556 00	90	694,642	150	100	265	1	5,706
Manchester, . .	451	902 00	390,305	809,372	14,973 00	1 19	1,199,677	307	87	102	-	4,310
Marblehead, . .	2,095	4,190 00	1,122,950	1,992,350	58,424 00	1 74	3,115,300	985	299	242	-	2,356
Methuen, . .	880	2,200 00	543,250	1,261,077	33,416 00	1 73	1,804,327	518	319	722	18	13,437
Middleton, . .	240	590 00	90,298	355,420	6,903 00	1 41	445,718	167	86	215	-	8,291
Nahant, . .	114	228 00	4,160,103	985,000	13,091 00	2 50	5,145,103	138	32	51	11	468
Newbury, . .	287	574 00	231,730	574,870	11,860 00	1 40	806,600	202	210	709	63	12,507
Newburyport, . .	2,907	5,814 00	3,682,545	4,018,701	156,758 00	1 96	7,701,246	1,817	448	351	21	4,001
North Andover, . .	689	1,888 00	706,317	1,343,184	32,117 00	1 47	2,049,501	424	237	580	134	15,805
Peabody, . .	1,986	3,972 00	2,397,400	2,589,150	93,730 00	1 80	4,986,550	1,054	604	529	51	9,045
Rockport, . .	927	1,854 00	583,581	1,050,571	37,454 00	2 18	1,634,152	557	93	141	-	3,158
Rowley, . .	814	722 00	99,195	444,387	7,006 00	1 20	543,582	236	159	371	11	10,054
Salem, . .	5,463	10,926 00	12,623,100	10,678,700	348,802 00	1 45	23,301,800	3,131	603	200	50	3,788

* New town; organized in August, 1870.

Aggregates of Polls, Property, Taxes, &c., as assessed May 1, 1870—Continued.

COUNTIES AND TOWNS.	Total number of Polls.	Total Tax on Polls.	Total Value of Personal Estate.	Total Value of Real Estate.	Total Tax for State, County, City, and Town purposes, including Highway Tax.	Rate of Total Tax, per \$100.	Total Valuation, May 1, 1870.	Total number of Dwelling-houses.	Total number of Horses.	Total number of Cows.	Total number of Sheep.	Total number of Acres of Land taxed in the City or Town.
Essex—Con.												
Salisbury, . . .	971	\$2,330 00	\$551,025	\$1,248,169	\$26,796 00	\$1 36	\$1,799,194	780	300	425	220	10,876
Saugus, . . .	534	1,068 00	457,160	1,004,929	22,999 00	1 50	1,462,089	380	186.	288	—	6,277
Swampscott, . . .	466	932 00	508,564	1,334,570	19,363 00	1 00	1,843,134	338	155	124	20	1,447
Topsfield, . . .	317	634 00	329,272	425,325	9,167 00	1 11	754,597	190	147	351	62	7,080
Wenham, . . .	246	492 00	110,400	371,675	7,627 00	1 48	482,075	172	138	266	26	4,282
West Newbury, . . .	506	1,012 00	353,865	746,740	15,586 00	1 32	1,100,605	359	279	630	148	7,950
Totals, . . .	48,981	\$104,143 00	\$54,655,725	\$80,575,096	2,280,250 00	—	\$135,230,821	28,450	10,323	18,437	1,532	268,098
FRANKLIN.												
Ashfield, . . .	334	\$668 00	\$187,399	\$871,303	\$13,851 00	\$2 00	\$558,702	246	229	498	2,548	24,047
Bernardston, . . .	241	482 00	136,593	318,939	6,880 00	1 29	455,532	203	184	366	464	13,665
Buckland, . . .	561	1,122 00	89,984	488,949	17,091 00	2 70	578,933	313	144	349	1,020	11,768
Charlemont, . . .	253	500 00	102,685	288,815	12,479 00	3 00	391,500	187	154	429	1,270	16,653
Colrain, . . .	363	726 00	217,622	509,381	20,571 00	2 07	727,003	307	279	606	1,791	24,995
Conway, . . .	875	748 00	329,716	517,060	18,876 00	1 55	846,776	272	238	658	776	22,680
Deerfield, . . .	920	2,854 00	469,841	868,874	30,079 00	2 08	1,388,715	599	470	722	435	20,510

1871.] PUBLIC DOCUMENT—No. 36.												
Erving, .	167	\$499 00	\$58,254	\$169,847	\$4,970 00	\$2 00	\$223,101	126	68	103	38	8,680
Gill, .	192	484 00	148,220	338,142	6,546 00	1 16	481,862	142	131	400	192	8,846
Greenfield, .	893	1,786 00	864,866	1,295,111	42,615 00	1 90	2,159,977	587	408	642	289	10,600
Hawley, .	182	364 00	48,834	122,038	6,336 00	3 00	170,872	130	136	308	1,411	17,880
Heath, .	159	498 00	70,211	182,300	5,221 00	2 06	252,511	130	117	293	594	14,492
Leverett, .	285	470 00	84,215	249,595	7,040 00	2 10	333,810	177	160	305	199	13,225
Leyden, .	112	399 00	69,224	188,558	5,632 00	2 03	257,782	105	101	254	641	9,733
Monroe, .	53	210 00	13,075	38,488	1,477 00	2 55	51,563	89	57	116	176	6,825
Montague, .	554	1,662 00	186,450	673,995	12,418 00	1 25	860,445	320	307	403	152	16,520
New Salem, .	265	1,060 00	74,466	259,700	9,791 00	2 61	334,166	232	180	387	186	16,975
Northfield, .	442	884 00	176,167	579,286	13,401 00	1 56	755,453	369	328	585	545	20,391
Orange, .	709	2,006 00	311,100	671,295	17,725 00	1 60	982,395	399	294	222	219	20,423
Rowe, .	140	280 00	51,446	134,980	5,474 00	2 67	186,426	109	105	216	655	14,385
Shelburne, .	363	726 00	355,115	595,265	17,160 00	1 70	950,380	254	204	411	1,012	13,882
Shutesbury, .	161	563 00	41,390	164,150	6,820 00	3 05	205,540	167	108	205	117	15,746
Sunderland, .	215	430 00	86,072	371,607	9,130 00	1 90	457,679	161	189	407	153	8,070
Warwick, .	227	603 00	83,843	177,712	7,160 00	2 50	261,555	181	141	279	334	21,538
Wendell, .	138	276 00	35,700	169,362	6,769 00	2 30	205,062	129	96	157	11	19,027
Whately, .	294	588 00	339,537	480,109	11,331 00	1 26	819,646	195	221	478	588	11,417
Totals, .	8,548	\$20,388 00	\$4,627,025	\$10,219,861	\$311,843 00	—	\$14,846,886	6,079	5,044	9,799	15,816	402,473

Aggregates of Polls, Property, Taxes, &c., as assessed May 1, 1870—Continued.

COUNTIES AND TOWNS.	Total number of Polls.	Total Tax on Polls.	Total Value of Personal Estate.	Total Value of Real Estate.	Total Tax for State, County, City, and Town purposes, including Highway Tax.	Rate of Total Tax, per \$100.	Total Valuation, May 1, 1870.	Total number of Dwelling-houses.	Total number of Horses.	Total number of Cows.	Total number of Sheep.	Total number of Acres of Land taxed in the City or Town.
HAMPDEN.												
Agawam, . . .	503	\$1,006 00	\$259,423	\$675,459	\$18,159 00	\$1 30	\$934,882	360	331	826	843	13,305
Blandford, . .	267	534 00	174,700	358,000	7,968 00	1 34	532,700	228	212	860	728	30,538
Brimfield, . .	326	652 00	256,145	420,835	12,499 00	1 75	676,980	253	209	945	455	20,916
Chester, . . .	332	1,062 00	136,668	354,146	9,818 00	1 78	490,814	230	159	417	641	20,640
Chicopee, . . .	2,272	4,544 00	1,318,952	2,672,385	68,965 00	1 62	3,991,337	1,295	443	511	19	12,800
Granville, . .	330	660 00	127,869	336,306	8,674 00	1 75	464,175	265	223	724	468	24,205
Holland, . . .	92	184 00	24,169	120,718	2,309 00	1 10	144,887	89	55	112	162	7,029
Holyoke, . . .	2,433	4,866 00	1,878,870	3,677,790	75,015 00	1 35	5,556,660	930	445	417	17	8,953
Longmeadow, .	354	708 00	378,710	767,880	11,830 00	97	1,146,590	279	329	658	121	13,623
Ludlow, . . .	254	508 00	120,612	372,608	8,254 00	1 56	498,220	216	220	451	275	13,872
Monson, . . .	678	1,356 00	465,108	853,797	21,800 00	1 55	1,318,900	498	347	619	484	25,882
Montgomery, .	103	306 00	37,720	119,380	8,338 00	1 98	157,100	69	61	155	289	8,606
Palmer, . . .	845	2,180 00	458,506	890,421	24,152 00	1 68	1,348,927	519	371	612	439	18,408
Russell, . . .	145	290 00	111,309	174,528	4,641 00	1 60	285,837	107	59	300	120	9,172
Southwick, . .	288	576 00	172,620	443,080	11,051 00	1 70	615,650	248	238	466	598	17,991

Springfield, .	6,837	\$18,674 00	\$6,070,060	\$18,843,990	\$312,643 00	\$1 20	\$24,914,050	3,613	1,411	580	140	16,866
Tolland, .	120	288 00	119,540	180,379	3,690 00	1 15	299,919	96	119	646	217	17,748
Wales, .	221	442 00	134,815	233,495	5,337 00	1 28	368,310	146	108	171	143	8,976
Westfield, .	1,852	3,704 00	1,435,649	3,502,098	80,239 00	1 55	4,937,747	1,077	729	858	320	25,107
West Springfield, .	614	1,228 00	539,696	1,275,706	23,058 00	1 20	1,815,342	431	284	492	57	9,253
Wilbraham, .	518	1,026 00	184,464	655,182	13,743 00	1 50	839,646	412	353	655	361	23,490
Totals, .	19,379	\$39,794 00	\$14,405,540	\$36,928,133	\$722,183 00	—	\$51,333,673	11,361	6,706	11,374	6,392	347,375
HAMPSHIRE,												
Amherst, .	933	\$1,800 00	\$864,160	\$1,857,384	\$42,689 00	\$1 50	\$2,721,544	687	567	820	603	15,874
Belchertown, .	606	1,630 00	266,057	858,112	18,605 00	1 51	1,124,169	503	519	1,113	612	30,787
Chesterfield, .	225	675 00	119,771	282,650	6,389 00	1 42	402,421	182	185	310	466	18,091
Cummington, .	274	822 00	120,336	267,432	6,558 00	1 48	387,768	222	206	398	607	13,780
Easthampton, .	697	1,742 00	1,134,526	1,395,972	34,024 00	1 27	2,530,498	520	297	416	42	6,808
Enfield, .	283	566 00	341,125	298,300	8,563 00	1 32	639,425	197	146	318	103	10,312
Goshen, .	99	358 00	33,368	114,235	2,938 00	1 75	147,603	80	79	184	321	10,228
Granby, .	244	488 00	123,643	408,973	8,308 00	1 46	532,616	185	212	526	371	15,045
Greenwich, .	187	514 00	98,534	206,731	7,063 00	2 18	305,265	143	137	353	216	11,376
Hadley, .	602	1,204 00	389,606	1,094,122	22,649 00	1 35	1,483,728	412	454	631	737	13,079
Hatfield, .	407	814 00	910,567	780,628	30,154 00	1 74	1,691,195	271	370	459	40	8,910
Huntington, .	256	512 00	151,416	382,610	12,092 00	2 20	534,026	224	140	280	273	14,675
Middlefield, .	176	352 00	209,610	225,070	6,812 00	1 44	434,680	127	111	246	1,107	14,162

Aggregates of Polls, Property, Taxes, &c., as assessed May 1, 1870—Continued.

COUNTIES AND TOWNS.	Total number of Polls.	Total Tax on Polls.	Total Value of Personal Estate.	Total Value of Real Estate.	Total Tax for State, County, City and Town, purposes, inclu- ding Highway Tax.	Rate of Total Tax, per \$100.	Total Valuation, May 1, 1870.	Total number of Dwelling-houses.	Total number of Horses.	Total number of Cows.	Total number of Sheep.	Total number of Acres of Land taxed in the City or Town.
HAMP.—Con.												
Northampton, .	2,258	\$4,516 00	\$2,591,400	\$4,227,400	\$103,389 00	\$1 45	\$6,818,800	1,448	844	963	191	21,465
Pelham, .	169	338 00	39,722	173,788	6,338 00	2 80	213,510	162	127	237	139	14,509
Plainfield, .	160	320 00	74,500	179,410	3,949 00	1 35	253,910	134	136	308	578	12,901
Prescott, .	143	286 00	36,894	182,556	5,982 00	2 58	219,450	115	93	328	91	10,894
South Hadley, .	643	1,800 00	454,713	1,045,394	24,302 00	1 50	1,500,107	375	283	535	168	9,042
Southampton, .	303	606 00	127,562	413,277	10,650 00	1 83	540,839	240	263	513	496	15,610
Ware, .	884	1,768 00	564,420	1,048,110	32,403 00	1 90	1,612,530	496	385	774	176	17,321
Westhampton, .	129	253 00	84,706	268,203	8,348 00	2 11	352,909	127	142	397	303	15,192
Williamsburg, .	558	1,116 00	600,000	879,600	37,559 00	2 04	1,479,600	380	250	640	1,000	15,585
Worthington, .	246	639 00	108,370	263,875	6,372 00	1 54	372,245	179	203	450	1,012	18,996
Totals, .	10,482	\$23,124 00	\$9,445,006	\$16,853,832	\$446,136 00	—	\$26,298,838	7,409	6,149	11,199	9,652	384,642
MIDDLESEX.												
Acton, .	432	\$1,058 00	\$223,973	\$751,040	\$14,737 00	\$1 40	\$975,013	316	237	782	5	11,693
Arlington, .	838	1,676 00	1,502,435	2,182,042	53,272 00	1 40	3,684,477	479	898	203	—	2,914
Ashby, .	290	832 00	139,166	385,165	12,669 00	2 00	524,831	245	240	526	51	12,375

Ashland, .	617	\$1,468 00	\$287,977	\$982,177	\$17,452 00	\$1 31	\$1,220,154	329	192	828	3	7,868
Bedford, .	219	488 00	112,422	418,947	7,825 00	1 05	526,869	178	176	472	8	8,154
Belmont, .	404	808 00	795,537	1,598,275	30,668 00	1 25	2,388,812	232	298	275	46	3,264
Billerica, .	473	1,169 00	587,380	882,837	12,771 00	79	1,469,717	868	267	516	33	15,392
Boxborough, .	99	198 00	46,581	195,026	5,756 00	2 30	241,607	74	96	471	19	6,405
Brighton, .	1,320	2,640 00	2,185,234	3,724,928	78,822 00	1 30	5,860,162	690	607	155	-	2,370
Burlington, .	205	410 00	141,987	326,124	6,683 00	1 34	468,111	125	189	289	1	7,204
Cambridge, .	9,435	18,870 00	13,997,100	29,100,100	622,231 00	1 40	43,097,200	5,909	2,002	320	-	3,300
Carlisle, .	157	314 00	60,924	326,924	5,744 00	1 40	387,848	120	121	322	23	9,415
Charlestown, .	7,995	15,990 00	9,064,900	18,904,200	463,496 00	1 60	27,969,100	3,992	1,655	14	-	520
Chelmsford, .	593	1,186 00	527,911	1,167,164	18,058 00	1 02	1,695,075	415	280	660	25	14,782
Concord, .	624	1,772 00	867,933	1,238,339	21,786 00	95	2,106,272	366	337	1,106	1	14,841
Dracut, .	516	1,445 00	280,850	886,690	15,721 00	1 29	1,167,540	346	320	993	71	14,455
Dunstable, .	135	270 00	71,148	230,972	4,609 00	1 40	302,120	107	127	381	100	10,391
Everett, .	584	1,752 00	283,529	1,452,850	24,846 00	1 33	1,736,379	414	190	168	-	1,959
Frammingham, .	1,167	2,384 00	1,382,820	2,265,470	42,465 00	1 10	3,448,290	792	573	994	104	15,000
Groton, .	941	1,882 00	797,685	1,610,798	26,202 00	1 00	2,408,483	674	421	848	118	23,249
Holliston, .	854	1,708 00	628,404	1,157,489	28,496 00	1 50	1,785,893	562	250	524	8	11,169
Hopkinton, .	1,048	2,625 00	725,517	1,324,770	37,580 00	1 70	2,050,287	687	351	699	7	15,958
Hudson, .	908	1,816 00	306,298	944,350	26,829 00	2 00	1,250,648	543	246	323	13	6,660
Lexington, .	629	1,258 00	531,543	1,723,286	30,572 00	1 30	2,254,829	408	397	985	20	10,050

Aggregates of Polls, Property, Taxes, &c., as assessed May 1, 1870—Continued.

COUNTIES AND TOWNS.	Total number of Polls.	Total Tax on Polls.	Total Value of Personal Estate.	Total Value of Real Estate.	Total Tax for State, County, City, and Town, purposes, inclu- ding Highway Tax.	Rate of Total Tax per \$100.	Total Valuation, May 1, 1870.	Total number of Dwelling-houses.	Total number of Horses.	Total number of Cows.	Total number of Sheep.	Total number of Acres of Land taxed in the City or Town.
MIDDLESEX—Con.												
Lincoln, . . .	213	\$673 00	\$227,931	\$411,631	\$11,546 00	\$1 70	\$639,562	136	180	560	6	8,844
Littleton, . . .	252	670 00	173,873	546,880	11,110 00	1 45	720,753	204	206	756	6	10,242
Lowell, . . .	8,577	17,154 00	8,941,028	17,031,460	378,173 00	1 39	25,972,488	5,421	1,192	289	2	2,650
Malden, . . .	1,812	4,711 00	1,340,802	3,658,470	84,849 00	1 68	4,999,272	1,128	333	128	-	3,200
Marlborough, . . .	2,146	4,292 00	472,333	2,105,520	61,005 00	2 20	2,577,853	1,053	392	809	33	12,790
Medford, . . .	1,480	2,960 00	2,230,634	3,741,870	84,186 00	1 36	5,972,504	902	353	229	69	5,120
Melrose, . . .	846	2,030 00	523,933	2,101,126	39,377 00	1 50	2,625,059	629	177	148	-	2,654
Natick, . . .	1,750	3,500 00	1,049,145	2,050,350	45,653 00	1 36	3,099,495	905	883	433	-	8,825
Newton, . . .	3,055	6,110 00	6,330,922	11,407,070	222,515 00	1 22	17,737,992	2,077	1,040	747	18	9,981
North Reading, . . .	273	546 00	81,812	405,100	8,911 00	1 70	486,912	195	112	249	4	7,679
Pepperell, . . .	514	1,028 00	396,362	706,243	13,949 00	1 10	1,102,605	390	308	628	156	13,480
Reading, . . .	729	2,041 00	285,653	1,526,592	28,283 00	1 45	1,812,245	520	222	306	1	5,747
Sherborn, . . .	282	733 00	267,860	687,095	14,544 00	1 45	954,455	197	209	529	4	9,895
Shirley, . . .	354	708 00	265,542	601,170	11,930 00	1 30	866,712	263	204	421	31	9,661
Somerville, . . .	3,406	6,812 00	2,840,150	9,750,750	185,608 00	1 42	12,590,900	2,276	893	226	-	1,970

Stoneham, .	1,288	\$3,001 00	\$303,065	\$1,521,758	\$47,999 00	\$2 35	\$1,914,828	686	246	170	15	3,668
Stow, .	484	1,152 00	271,556	787,713	13,157 00	1 19	1,009,269	845	225	740	6	12,371
Sudbury, .	579	1,158 00	473,200	1,010,305	16,837 00	1 02	1,483,505	861	277	794	8	16,571
Tewksbury,	808	616 00	211,805	747,685	9,371 00	90	959,490	240	225	526	14	13,700
Townsend, .	596	1,192 00	179,329	576,313	21,856 00	2 70	755,642	409	305	474	73	19,347
∞ Tyngsborough,	175	350 00	62,297	244,991	6,773 00	1 73	307,288	137	103	250	81	9,766
Wakefield, .	1,283	3,220 00	779,330	1,765,193	36,298 00	1 30	2,544,523	684	255	223	-	3,874
Waltham, .	2,121	4,242 00	2,259,900	4,638,500	104,269 00	1 45	6,898,400	1,153	567	665	49	7,703
Watertown,	1,040	2,080 00	1,391,899	2,773,181	58,309 00	1 35	4,165,080	587	347	238	-	2,078
Wayland, .	399	905 00	197,079	469,719	10,906 00	1 50	666,798	238	224	479	25	9,140
Westford, .	519	1,038 00	270,109	709,937	13,326 00	1 25	980,046	317	215	578	27	17,900
Weston, .	324	648 00	473,783	606,900	12,319 00	1 08	1,080,683	219	286	762	2	10,502
Wilmington,	214	428 00	87,038	426,039	7,243 00	1 34	513,077	173	131	190	11	10,155
Winchester,	706	1,412 00	1,384,328	1,938,283	32,146 00	95	3,322,611	443	233	180	8	3,569
Woburn, .	2,443	4,886 00	3,010,845	4,812,710	106,592 00	1 30	7,823,555	1,323	534	401	-	7,730
Totals, .	68,656	\$144,205 00	\$72,372,297	\$153,430,017	\$3,307,825 00	-	\$225,802,314	41,977	20,342	25,481	1,295	490,201
NANTUCKET.	941	\$1,882 00	\$1,273,639	\$703,374	\$29,560 00	\$1 40	\$1,977,013	709	180	379	861	10,029
NORFOLK.												
Bellingham,	330	\$660 00	\$102,904	\$410,215	\$8,843 00	\$1 57	\$513,119	245	157	350	9	10,825
Braintree, .	1,084	2,168 00	668,950	1,315,950	55,363 00	2 68	1,984,900	631	262	344	14	8,101

Aggregates of Polls, Property, Taxes, &c., as assessed May 1, 1870—Continued.

COUNTIES AND TOWNS.	Total number of Polls.	Total Tax on Polls.	Total Value of Personal Estate.	Total Value of Real Estate.	Total Tax for State, County, City, and Town purposes, inclu- ding Highway Tax.	Rate of Total Tax, per \$100.	Total Valuation, May 1, 1870.	Total number of Dwelling-houses.	Total number of Horses.	Total number of Cows.	Total number of Sheep.	Total number of Acres of Land taxed in the City or Town.
NORFOLK—Con.												
Brookline, .	1,415	\$2,830 00	\$10,567,200	\$8,381,100	\$144,942 00	\$0 75	\$18,948,300	876	629	347	—	4,090
Canton, .	925	1,850 00	1,015,815	1,525,395	34,881 00	1 30	2,541,210	566	306	361	63	11,554
Cohasset, .	564	1,128 00	823,032	943,328	24,374 00	1 30	1,766,360	449	151	213	245	5,950
Dedham, .	1,753	3,506 00	2,396,055	3,229,726	79,455 00	1 35	5,625,781	1,143	651	1,112	19	18,537
Dover, .	170	476 00	68,526	312,041	7,059 00	1 73	380,567	125	132	303	14	8,959
Foxborough, .	700	1,400 00	366,463	1,047,341	25,787 00	1 72	1,413,804	562	295	357	—	12,000
Franklin, .	591	1,182 00	736,200	875,350	25,355 00	1 50	1,611,550	424	282	478	2	15,471
Hyde Park, .	1,256	2,512 00	838,355	4,018,859	51,084 00	1 00	4,857,214	805	155	80	1	2,800
Medfield, .	290	580 00	285,797	496,620	8,640 00	1 03	782,417	222	171	398	3	8,123
Medway, .	870	1,740 00	451,739	1,135,400	29,515 00	1 75	1,587,139	610	339	699	—	12,765
Milton, .	607	1,214 00	2,477,900	2,338,300	44,560 00	90	4,816,200	441	419	550	—	7,890
Needham, .	941	1,882 00	814,571	2,122,851	41,244 00	1 34	2,937,422	608	396	472	69	13,927
Norfolk, .	270	740 00	146,704	328,364	5,111 00	72	475,068	171	116	291	71	8,895
Quincy, .	1,885	3,670 00	1,276,450	8,173,050	64,183 00	1 36	4,449,500	1,143	497	579	—	8,852
Randolph, .	1,515	3,030 00	1,426,800	1,454,190	52,105 00	1 70	2,880,990	984	299	328	13	10,219

Sharon, . . .	369	\$788 00	\$200,927	\$590,597	\$11,259 00	\$1 12	\$791,524	283	173	871	16	14,716
Stoughton, . .	1,194	2,388 00	851,755	1,498,800	81,709 00	1 25	2,345,555	848	818	447	-	11,961
Walpole, . . .	539	1,078 00	889,286	904,594	15,311 00	1 10	1,293,880	390	299	558	54	10,920
West Roxbury, .	2,081	4,162 00	4,511,400	7,925,700	204,538 00	1 50	12,487,100	1,339	733	379	7	6,545
Weymouth, . .	2,526	6,416 00	2,104,360	2,823,138	80,329 00	1 50	4,927,498	1,509	659	549	14	9,550
Wrentham, . .	543	1,336 00	244,008	863,924	17,068 00	1 42	1,107,932	487	278	463	53	18,983
Totals, . . .	22,368	\$46,686 00	\$32,765,197	\$47,709,833	\$1,062,715 00	-	\$80,475,030	14,861	7,717	10,029	667	241,705
PLYMOUTH.												
Abington, . . .	2,587	\$6,209 00	\$1,368,782	\$2,838,320	\$90,351 00	\$2 00	\$4,207,102	1,561	706	725	9	14,547
Bridgewater, .	861	2,239 00	766,583	1,315,039	26,703 00	1 17	2,081,622	599	350	465	34	15,681
Carver, . . .	276	767 00	212,327	322,660	7,241 00	1 21	534,987	224	137	221	166	18,309
Duxbury, . . .	645	1,535 00	300,400	731,200	16,350 00	1 40	1,031,600	502	259	300	51	12,985
East Bridgewater,	827	1,654 00	320,979	937,145	23,538 00	1 70	1,258,124	538	311	504	14	10,961
Halifax, . . .	196	392 00	43,499	278,806	4,841 00	1 40	822,305	148	86	186	46	9,188
Hanover, . . .	454	1,285 00	365,380	569,011	15,611 00	1 53	934,341	346	196	243	148	9,312
Hanson, . . .	350	882 00	80,550	379,566	8,183 00	1 58	460,116	280	139	161	27	8,945
Hingham, . . .	1,164	2,328 00	1,134,935	1,853,812	39,071 00	1 20	2,988,747	866	393	529	857	12,973
Hull, . . .	74	196 00	41,744	218,868	2,696 00	96	260,612	72	36	47	57	1,493
Kingston, . . .	418	836 00	600,738	596,897	10,662 00	82	1,197,635	321	170	205	31	10,357
Lakeville, . .	328	656 00	99,690	410,562	10,353 00	1 62	510,252	231	175	812	310	17,811

Aggregates of Polls, Property, Taxes, &c., as assessed May 1, 1870—Continued.

COUNTIES AND TOWNS.	Total number of Polls.	Total Tax on Polls.	Total Value of Personal Estate.	Total Value of Real Estate.	Total Tax for State, County, City and Town purposes, including Highway Tax.	Rate of Total Tax, per \$100.	Total Valuation, May 1, 1870.	Total number of Dwelling-houses.	Total number of Horses.	Total number of Cows.	Total number of Sheep.	Total number of Acres of Land taxed in the City or Town.
PLYM'TH—Con.												
Marion, . . .	262	\$524 00	\$171,838	\$320,332	\$7,046 00	\$1 32	\$492,170	201	73	110	23	7,170
Marshfield, . .	455	910 00	149,060	625,740	15,453 00	1 80	774,800	400	227	390	180	16,054
Mattapoissett, .	369	738 00	106,562	462,055	10,402 00	1 70	568,617	314	97	170	42	9,565
Middleborough, .	1,316	3,290 00	512,380	1,715,906	34,636 00	1 41	2,228,286	907	569	809	255	88,664
N. Bridgewater, .	2,079	4,158 00	1,116,272	2,327,508	78,034 00	2 00	3,443,780	1,196	505	529	9	11,493
Pembroke, . . .	419	1,006 00	155,957	443,203	9,582 00	1 44	599,160	336	218	247	163	12,485
Plymouth, . . .	1,513	3,026 00	1,357,200	2,028,375	63,966 00	1 80	3,385,575	961	378	426	205	46,641
Plympton, . . .	216	596 00	51,292	254,056	6,055 00	1 80	305,348	188	96	189	4	8,202
Rochester, . . .	313	626 00	105,073	397,780	8,116 00	1 50	502,853	241	152	295	103	17,600
Scituate, . . .	665	1,662 00	229,634	794,911	20,446 00	1 83	1,024,545	488	245	352	189	9,918
South Scituate, .	460	1,251 00	250,840	586,309	15,478 00	1 70	837,149	383	244	282	51	12,275
Wareham, . . .	713	1,675 00	444,090	592,070	19,314 00	1 70	1,036,160	466	192	220	100	18,945
W. Bridgewater, .	437	874 00	255,453	570,544	13,248 00	1 50	825,997	326	247	352	4	9,969
Totals, . . .	17,397	\$39,815 00	\$10,241,208	\$21,570,675	\$552,376 00	-	\$31,811,883	12,145	6,201	8,769	3,078	301,543

SUFFOLK.												
Boston, .	56,926	\$113,852 00	218,496,300	\$365,593,100	\$9,050,420 00	\$1 53	\$584,089,400	27,360	7,345	1,091	106	9,306
Chelsea, .	4,143	8,286 00	1,706,450	10,845,750	249,830 00	2 00	12,052,200	2,882	626	83	-	1,020
North Chelsea, .	275	550 00	125,025	879,275	14,610 00	1 40	1,004,300	172	157	143	-	3,373
Winthrop, .	133	266 00	54,901	430,090	6,171 00	1 21	484,991	116	70	51	-	848
Totals, .	61,477	\$122,954 00	220,382,676	\$377,248,215	\$9,320,531 00	-	\$597,630,891	30,530	8,198	1,368	106	14,547
WORCESTER.												
Ashburnham, .	606	\$1,969 00	\$253,792	\$721,615	\$20,002 00	\$1 85	\$975,407	424	258	453	122	22,997
Athol, .	1,000	2,750 00	508,299	1,420,905	32,331 00	1 53	1,929,204	630	409	438	119	18,777
Auburn, .	248	496 00	149,145	384,622	7,781 00	1 36	533,767	156	135	517	61	8,880
Barre,. .	639	1,879 00	579,048	1,253,140	27,989 00	1 42	1,832,188	484	448	1,712	129	26,320
Berlin, .	272	544 00	105,024	318,523	7,823 00	1 74	423,547	205	171	391	97	7,835
Blackstone,. .	1,196	2,392 00	932,130	1,396,025	36,499 00	1 41	2,328,155	657	227	306	8	9,700
Bolton, .	296	793 00	174,401	410,959	9,504 00	1 48	585,360	199	220	449	173	11,819
Boylston, .	193	386 00	152,420	394,240	7,399 00	1 26	546,660	158	159	412	17	11,632
Brookfield, .	668	1,590 00	355,034	771,630	25,445 00	2 12	1,126,664	420	285	463	274	14,014
Charlton, .	510	1,515 00	299,430	702,470	13,137 00	1 16	1,001,900	398	357	892	301	25,471
Clinton, .	1,203	2,406 00	960,113	1,992,455	49,942 00	1 61	2,952,568	572	208	188	-	3,792
Dana, .	195	593 00	84,146	185,599	5,393 00	1 77	269,745	170	134	249	75	10,788
Douglas, .	547	1,094 00	219,952	746,818	16,131 00	1 32	966,770	355	187	335	25	20,282

Aggregates of Polls, Property, Taxes, &c., as assessed May 1, 1870—Continued.

COUNTIES AND TOWNS.	Total number of Polls.	Total Tax on Polls.	Total Value of Personal Estate.	Total Value of Real Estate.	Total Tax for State, County, City, and Town, purposes, inclu- ding Highway Tax.	Rate of Total Tax, per \$100.	Total Valuation, May 1, 1870.	Total number of Dwelling-houses.	Total number of Horses.	Total number of Cows.	Total number of Sheep.	Total number of Acres of Land taxed in the City or Town.
WATER—Con.												
Dudley, .	529	\$1,349 00	\$261,595	\$719,618	\$19,469 00	\$1 80	\$981,213	299	185	434	176	13,015
Fitchburg, .	3,248	9,874 00	3,038,828	7,334,575	163,457 00	1 48	10,373,403	1,652	777	644	42	16,665
Gardner, .	943	2,725 00	597,729	1,160,966	25,597 00	1 30	1,758,695	554	310	371	47	12,702
Grafton, .	1,018	2,036 00	612,774	1,125,520	34,020 00	1 84	1,738,294	632	354	911	26	13,629
Hardwick, .	499	1,372 00	451,670	712,040	18,013 00	1 43	1,163,710	324	305	1,463	108	23,726
Harvard, .	361	975 00	295,330	708,530	14,076 00	1 30	1,003,860	281	300	957	29	16,292
Holden, .	438	876 00	232,835	672,980	17,181 00	1 80	905,815	340	293	565	36	21,400
Hubbardston, .	431	1,362 00	288,707	665,750	16,266 00	1 65	904,457	324	257	1,160	260	24,524
Lancaster, .	407	814 00	1,383,915	699,286	21,642 00	1 00	2,083,201	324	332	601	77	15,835
Leicester, .	689	1,964 00	988,790	964,717	22,727 00	1 10	1,953,507	478	309	584	16	14,521
Leominster, .	1,150	2,300 00	763,355	1,986,239	40,794 00	1 40	2,749,594	676	448	910	70	17,658
Lunenburg, .	317	634 00	148,857	603,004	11,936 00	1 50	751,861	255	285	470	60	15,953
Mendon, .	298	843 00	209,708	491,338	8,163 00	1 04	701,046	244	144	329	31	10,886
Milford, .	2,639	5,278 00	1,647,233	3,206,176	104,776 00	2 05	4,853,409	1,356	530	637	1	11,896
Millbury, .	994	1,998 00	725,448	1,189,158	28,851 00	1 41	1,914,606	509	287	432	69	9,071

New Braintree, .	170	\$556 00	\$198,262	\$380,300	\$8,550 00	\$1 40	\$573,562	125	162	1,095	43	12,457
Northborough, .	378	945 00	389,942	808,885	18,170 00	1 44	1,198,777	282	222	647	40	11,134
Northbridge, .	848	1,096 00	651,951	1,007,257	22,936 00	1 16	1,659,208	390	185	295	8	10,520
North Brookfield, .	922	2,484 00	598,244	969,805	24,756 00	1 42	1,568,049	445	326	590	33	12,825
Oakham, .	220	638 00	90,896	282,783	7,097 00	1 74	373,629	181	163	531	148	12,861
Oxford, .	677	1,354 00	411,600	831,090	20,616 00	1 55	1,242,690	474	244	513	83	15,789
Paxton, .	188	522 00	89,334	230,311	4,938 00	1 41	319,645	142	125	281	53	8,450
Petersham, .	327	903 00	226,700	548,650	11,668 00	1 39	775,350	280	234	853	186	23,369
Phillipston, .	182	530 00	73,375	220,980	5,534 00	1 70	294,355	138	136	358	70	14,260
Princeton, .	320	640 00	220,916	728,562	9,188 00	90	949,478	251	250	640	236	21,490
Royalston, .	373	996 00	353,480	466,275	17,078 00	1 96	819,755	280	274	460	127	25,561
Rutland, .	268	536 00	110,783	408,162	10,720 00	1 90	518,945	219	155	533	321	21,420
Shrewsbury, .	437	874 00	405,260	697,980	13,010 00	1 10	1,103,240	314	307	710	79	12,714
Southborough, .	526	1,210 00	460,638	921,460	18,072 00	1 22	1,382,098	361	267	881	3	9,516
Southbridge, .	1,270	2,540 00	847,353	1,391,015	40,289 00	1 65	2,238,368	482	386	464	140	12,540
Spencer, .	939	1,878 00	779,990	1,341,220	24,151 00	1 05	2,121,210	501	410	787	111	20,215
Sterling, .	450	900 00	391,311	812,900	14,869 00	1 16	1,204,211	355	286	906	21	18,045
Sturbridge, .	510	1,020 00	279,381	692,755	10,547 00	98	972,136	329	282	596	453	22,437
Sutton, .	586	1,172 00	321,580	861,530	23,967 00	1 70	1,183,110	430	296	607	48	19,812
Templeton, .	738	1,845 00	391,065	788,008	22,675 00	1 77	1,179,073	459	310	449	79	19,164
Upton, .	535	1,070 00	231,688	585,514	15,244 00	1 55	817,202	364	246	431	39	12,545

Aggregates of Polls, Property, Taxes, &c., as assessed May 1, 1870—Concluded.

COUNTIES AND TOWNS.	Total number of Polls.	Total Tax on Polls.	Total Value of Personal Estate.	Total Value of Real Estate.	Total Tax for State, County, City, and Town, purposes, inclu- ding Highway Tax.	Rate of Total Tax per \$100.	Total Valuation, May 1, 1870.	Total number of Dwelling-houses.	Total number of Horses.	Total number of Cows.	Total number of Sheep.	Total number of Acres of Land taxed in the City or Town.
WO'STER—Con.												
Uxbridge, .	748	\$1,496 00	\$677,227	\$1,089,053	\$42,120 00	\$2 30	\$1,766,280	445	301	570	71	17,520
Warren, .	690	1,380 00	440,519	1,006,735	25,854 00	1 70	1,447,254	405	228	1,161	175	16,332
Webster, .	1,203	2,406 00	718,383	958,460	26,038 00	1 30	1,676,843	458	234	233	37	7,390
Westborough, .	862	1,724 00	530,063	1,399,860	25,581 00	1 30	1,929,923	517	356	1,040	4	12,152
West Boylston, .	627	1,254 00	295,975	689,755	16,383 00	1 52	985,730	381	251	477	49	8,219
W. Brookfield, .	444	888 00	254,443	560,024	15,104 00	1 50	814,467	296	194	684	21	12,141
Westminster, .	459	1,418 00	218,561	616,520	16,558 00	1 81	835,081	341	261	554	146	21,000
Winchendon, .	943	2,716 00	612,567	1,173,808	28,440 00	1 44	1,786,375	610	368	438	227	24,956
Worcester, .	10,651	21,302 00	9,849,400	24,169,050	595,214 00	1 74	34,018,450	4,679	2,085	1,380	101	21,096
Totals, .	49,020	\$111,700 00	\$37,485,595	\$79,577,505	\$1,941,211 00	-	\$117,063,100	28,010	17,808	36,437	5,596	908,010

RECAPITULATION.

COUNTIES.	Total number of Polls.	Total Tax on Polls.	Total Value of Personal Estate.	Total Value of Real Estate.	Total Tax for State, County, City and Town purposes, inclu- ding Highway Tax.	Total Valuation, May 1, 1870.	Total number of Dwelling-houses.	Total number of Horses.	Total number of Cows.	Total number of Sheep.	Total number of Acres of Land taxed in the City or Town.
Barnstable, .	8,445	\$17,013	\$7,073,047	\$7,798,433	\$242,640	\$14,871,480	6,748	2,282	3,540	1,078	162,627
Berkshire, .	14,829	31,991	14,153,668	22,975,256	485,439	37,128,919	10,181	8,469	19,578	28,646	541,969
Bristol, .	25,749	52,417	36,439,943	43,985,848	1,184,046	80,425,791	14,792	7,408	9,134	2,751	309,573
Dukes, .	1,067	2,122	768,974	1,461,763	35,814	2,230,737	1,119	371	661	9,591	45,757
Essex, .	48,981	104,143	54,655,725	80,575,096	2,280,250	135,230,821	28,450	10,323	13,437	1,532	268,098
Franklin, .	8,548	20,388	4,627,025	10,219,861	311,843	14,846,886	6,079	5,044	9,799	15,816	402,473
Hampden, .	19,379	39,794	14,405,540	36,928,133	722,183	51,333,673	11,361	6,706	11,374	6,392	347,375
Hampshire, .	10,482	23,124	9,445,006	16,853,832	446,136	26,298,838	7,409	6,149	11,199	9,652	334,642
Middlesex, .	68,656	144,205	72,372,297	153,430,017	3,307,825	225,802,314	41,977	20,342	25,481	1,295	490,201
Nantucket, .	941	1,882	1,273,639	703,374	29,560	1,977,013	709	180	379	861	10,029
Norfolk, .	22,368	46,686	32,765,197	47,709,833	1,062,715	80,475,030	14,861	7,717	10,029	667	241,705
Plymouth, .	17,397	89,315	10,241,208	21,570,675	552,376	31,811,883	12,145	6,201	8,769	3,078	361,543
Suffolk, .	61,477	122,954	220,382,676	377,248,215	9,320,531	597,630,891	30,530	8,198	1,368	106	14,547
Worcester, .	49,020	111,700	37,485,595	79,577,505	1,941,211	117,063,100	28,010	17,808	36,437	5,596	908,010
Totals, .	357,339	\$757,734	\$516,089,535	\$901,037,841	\$21,922,569	\$1,417,127,376	214,371	107,198	161,185	87,061	4,438,549

PUBLIC DOCUMENT.....

.....No. 37.

SECOND ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF

MASSACHUSETTS

JANUARY, 1871.

BOSTON:

WRIGHT & POTTER, STATE PRINTERS,

79 MILK STREET (CORNER OF FEDERAL).

1871.

MEMBERS OF THE BOARD.

H. I. BOWDITCH OF BOSTON, *Chairman.*

R. T. DAVIS OF FALL RIVER.

P. EMORY ALDRICH OF WORCESTER.

W. C. CHAPIN OF LAWRENCE.

WARREN SAWYER OF BOSTON.

RICHARD FROTHINGHAM OF CHARLESTOWN.

GEORGE DERBY OF BOSTON, *Secretary.*

CONTENTS.

	Page.
1. General Report of the Board,	2
2. Expenses of the Board in 1870,	18
3. Report of the Secretary,	19
4. Poisoning by Lead-pipe used for the Conveyance of Drinking- water,	21
5. Trichina Disease in Massachusetts,	45
6. Health of Towns,	51
7. Charbon in Massachusetts,	85
8. The Causes of Typhoid Fever,	109
9. Homes for the Poor—Convalescent Homes—The Sewage Ques- tion,	181
10. Correspondence concerning the Effects of Intoxicating Drinks,	245
11. Analysis of the Mortality of the City of Boston in 1870, . . .	349
12. The Ventilation of School-houses,	369
13. Mystic Pond and its Sources of Supply,	385
14. Air and its Impurities,	395
15. Health of Minors Employed in Factories,	409
16. Use of Milk from Cows affected with "Foot and Mouth Dis- ease,"	425

ALPHABETICAL INDEX.

	Page.
Air and its impurities,	15, 396
“ of Boston,	399
“ of Cambridge,	404
“ of Schools in Boston,	400
“ of Halls, &c., in Boston,	402
“ Letter from Mr. Stodder concerning,	406
Aphtha Epizoötica, Description of,	427
Allen's Buildings in London, Description of,	208
Alcoholic drinks, Report on,	11
“ “ Circulars concerning,	246, 256
“ “ Correspondence concerning, from Massachusetts,	246
and from foreign countries, as follows :	
Ancona,	257
Athens,	257
Alexandria,	320
Basle,	360
Beirut,	310
Berlin,	264
Berne,	261
Bremen,	264
Ceylon,	311
Cape Haytien,	321
Cadiz,	267
Cologne,	274
Constantinople,	265
Copenhagen,	268
Darien,	346
Dublin,	278
Edinburgh,	336
Elsinore,	280
Fayal,	289
Florence,	286
Frankfort-on-the-Main,	282
Funchal,	309
Japan,	316, 341

	Page.
Leipsic,	291
Lima,	327
Liverpool,	292
London,	295
Malta,	296
Manchester,	297
Nicaragua,	323
Odessa,	300
Para,	328
Pernambuco,	329
Rotterdam,	340
Sandwich Islands,	341
San Juan del Sur,	331
St. Croix,	324
Teneriffe,	302
Toronto,	325
Trinidad de Cuba,	326
Trieste,	331
Utrecht,	344
Vienna,	303
Zanzibar,	321
Zurich,	303
Bacteria in blood,	94
Bowditch, Letter of Dr. H. I.,	182
Brighton, Nuisances in,	3
" " Foot and mouth disease " in,	428
Breton farm in England,	240
Boston, Consulting physicians of,	56
" Tenement-houses of,	5, 59
" Neglect of health authorities of,	56
" Letter to aldermen of,	5
" Mortality of,	13, 349
" Typhoid fever in,	123
" Health districts of,	350
" Tabular analysis of mortality in,	354
" Death-rate of, in 1870,	365
" Distribution of disease in,	366
Convalescent homes,	229
Coutts', Miss, buildings in London,	199
Charbon, or malignant vesicle,	9, 86
" Symptoms in man,	87
" " in animals,	89
" Morbid changes in,	90

ALPHABETICAL INDEX.

ix

	Page.
Charbon, Specific virus in,	91
“ Methods and sources of infection,	97
“ Value of disinfectants in,	104
Cochituate water, Analysis of,	85
“ “ Action on lead-pipe,	85
Drainage, Letter concerning, in Concord,	64
Dwelling Company, Improved Industrial,	201
Dwellings of London poor, Improvement of,	193
Earth-closet,	285
Expenses of the Board,	17, 18
“ Foot and mouth disease ” of cattle,	4, 426
“ “ “ “ “ Inoculation with,	480
“ “ “ “ “ Conclusions concerning,	482
Factory operatives, Health of,	16, 410
Haskins, Dr. A. L., Examination of tenement-houses,	219
Homes for the people,	10, 217
Hill, Miss Octavia,	212
Hill, Mr. H. B., Examinations of air,	404
Health of towns,	8, 51
“ of minors in factories,	16, 410
Irrigation of land,	241
Jarrow Building Company,	210
Lead, Poisoning by,	8, 21
Lead-poison, Letters from towns concerning,	22
Lead-pipe water, Influence of,	40
Lead in water, Poisonous amounts of,	42
Lead-poison, Susceptibility to,	42
Lead-pipe, Substitutes for,	43
Lead-pipe protected by certain salts,	38
Lead acted on by water—Bibliography,	88
Laws, English, concerning lodging-houses,	243
Model house and common tenement-house compared,	218
Mystic Pond water,	15, 886
“ “ Chemical report, concerning	887
“ “ Conclusions regarding,	890
Martin, Report of A. C., on ventilation of school-houses,	369
Manufacturers, Reports from,	412

	Page.
Mortality among minors in factories,	16, 420
" " " " Remarks on,	422
" of the City of Boston,	18, 349
Milk from diseased cows,	4, 426
Meat, Need of inspection of,	8
" from diseased cattle,	482
Morin's experiments with ventilation,	379
Nichols, Report of Professor W. R., concerning lead,	32
" " " " concerning Mystic water,	387
Nichols, Report of Dr. A. H., on Charbon,	86
" " " " on "foot and mouth disease,"	426
Pearson, Mr. A. H., Examinations of air,	399
Peabody Buildings, London,	194
Poor, Organized work among the,	212
Report, General, of Board,	2
" of Secretary,	19
Smallpox in Massachusetts,	6
" in Ireland,	7
Sewing-machines,	16
School-houses, Ventilation of,	14, 369
Sanderson's, Dr., investigations,	91
Smith, Dr. R. Angus, on air,	898, 405
Stodder, Letter from Mr.,	406
Sewage question,	233
Sewers of London,	238
Tenement-houses in London and Boston, night inspection of,	183
Tenement-house and model lodging-house compared,	218
Tenement-houses of Boston,	5, 59
Trichina disease,	8, 46
" " Signs of,	47
" " in Lowell and Saxonville,	48
" " Prevention of,	50
Towns, Health of,	8, 52
" Reports from, concerning disease and its causes,	54
" Reports from, concerning lead,	23, 32
" Reports from, concerning typhoid,	119
" Reports from, concerning alcoholic drinks,	246
Typhoid fever,	9, 110
" " Registration of deaths from,	111
" " Opinion of correspondents concerning,	111, 118

ALPHABETICAL INDEX.

xi

	Page.
Typhoid fever, circular concerning,	112
“ “ Dr. Pettenkofer on,	112, 175
“ “ Table of deaths from,	114
“ “ Reports from towns, concerning,	119
“ “ in Boston,	128
“ “ a disease of country rather than town,	118
“ “ Report of a case of,	129
“ “ among the Shakers,	161
“ “ Dr. Nathan Smith on,	168
“ “ Modes of propagation of,	165
“ “ Tracing the causes of,	169
“ “ springing from the soil,	171, 176
“ “ Dr. Rush on,	171, 179
“ “ in Martha's Vineyard,	143, 172
“ “ on clay subsoil,	178
“ “ Dr. James Jackson on,	174
“ “ and intermittents,	174
“ “ and decomposition,	178
“ “ Prevention of,	178
Ventilation of school-houses,	14, 369
“ explained,	370
“ Amount of air needed for,	378
“ Theory of efficient,	376
“ explanation of plans for,	381
“ General Morin's plans for,	379
Waterlow Buildings in London,	204
Water of various cities compared,	898
Walpole, Charbon in,	86, 99

ERRATA.

In Typhoid table, pages 114 and 115 :

Opposite Adams, for 7,475, read 747.

“ Fall River, for 17,451, read 17,481.

“ Montgomery, for 853, read 853 ; for 948, read 892.

Commonwealth of Massachusetts.

BOSTON, Jan. 21, 1871.

HON. HORACE H. COOLIDGE, *President of the Senate of Massachusetts:*

SIR,—I have the honor to present to the Legislature the
Second Annual Report of the Massachusetts State Board of
Health.

Very respectfully,
Your obedient servant,

GEORGE DERBY,
Secretary of the State Board of Health.

GENERAL REPORT OF THE BOARD.

*To the Honorable the Senate and the House of Representatives
of Massachusetts :*

The State Board of Health, in presenting to the General Court its Second Annual Report, desires to acknowledge the courtesy and cordial reception it has met with from the civil authorities, and from the local boards of health of the towns of the Commonwealth. At the suggestion of this Board,* correspondents have been appointed by the authorities in various towns. These correspondents form an efficient body of aids. Their letters and other labors, some of which will be presented in this Report, have already added immensely to the power for really good sanitary work, which, through the liberality of the legislature, the Board has enjoyed. It is our hope that this corre-

* The following circular was sent to every town in January, 1870:—

[CIRCULAR.]

To the Board of Health of the of

GENTLEMEN,—The State Board of Health is desirous of establishing such communication with every city and town in Massachusetts that they may be able to investigate the causes of disease and death. They believe such causes to be often obscure when examined in detail, but that when grouped and classified in large numbers they sometimes reveal the existence of influences which have an important bearing upon public health, and the prevention of disease.

They would like to have a medical correspondent in every town, to whom they could apply for local information—some physician possessing your confidence, and who would be willing for the public good, to report to us facts relating to disease occurring within your jurisdiction.

Will you have the kindness to send us the name of some one physician, upon whose information we may rely, and who will be willing to perform the service to which we have referred?

In behalf of the State Board of Health,

Very respectfully yours,

GEORGE DERBY,
Secretary State Board of Health.

spondence and these labors will annually become more valuable contributions to scientific medicine and, at the same time, that they will tend to give more knowledge of sanitary matters to every citizen who wishes to educate his family to perfect health.

LEGISLATIVE RESULTS OF LAST YEAR'S LABORS.

Among the most agreeable results of the labors of the Board last year was the passage, by the legislature, of an Act of incorporation to enable certain persons to build an abattoir at Brighton. The same Act imposed upon the Board very important duties in reference to the building itself and to the establishment of sanitary rules upon which it was to be subsequently managed. We hailed this Act as one destined to bring great benefit to the comfort, health, and, we may add, to the wealth of Brighton. We regret to say that, as yet, no practical result has come from the Act, owing, as we have good reason for believing, to the persistent opposition of the butchers of that town. The Board desires to bring the subject again earnestly before the legislature and whole community, as well as before the citizens of Brighton.

We are informed that indictments are now pending against three or four slaughter-houses in Brighton as nuisances to the immediate neighborhood.

We may also remark that the building of an abattoir, with its thorough sanitary rules, is quite as important to the community at large, consumers of the meat slaughtered at Brighton, as to the inhabitants of that town. The Commissioners on Cattle have already ordered that no cattle shall be carried from Brighton. Many affected with the "foot and mouth disease" are liable to be slaughtered at private establishments, in different parts of the State and the meat then sent to the consumers, and eaten. This cannot be prevented until proper inspection before the killing of the animals can be enforced, as is now done in all the regularly constituted abattoirs of Europe.

In order to aid still further a true appreciation of the importance of this subject, we recommend the perusal of two reports presented this year, viz.: that upon the "Health of Towns" and that upon "Typhoid Fever in Massachusetts." In these reports, besides an immense mass of evidence going to prove the deleterious results arising from the decomposition of animal

refuse, some of our correspondents allude especially to the bad effects caused by proximity to slaughter-houses.

THE FOOT AND MOUTH DISEASE IN CATTLE. — ITS EFFECTS ON MAN.

This subject, save in its immediate relation to man, has been examined by another board (Commissioners on the Cattle Disease), and efficient action has been taken thereupon. The disease has been prevalent for some time in New England. Every one naturally feels desirous of knowing what, if any, would be the effects of the use of milk from diseased cows, or from the eating of flesh of diseased cattle. The Board has had no opportunity to thoroughly investigate this subject in this State, although attention has been given to it during the past few weeks. Meanwhile we feel that it may be well to give a brief abstract of the results of English investigations.

It appears that, in consequence of the extensive prevalence of the disease, during the autumn of 1869, in various parts of England, the Privy Council determined to make a special examination of the question as to "the effects produced on the human subject by the use of milk derived from animals suffering" from this disease.

Dr. Thorne, the special investigator, visited at least thirteen towns, some of which had large populations. The evidence was conflicting, but Dr. Thorne feels justified in making the following inferences* as the conclusion at which he arrives:—

"I. That disease appears sometimes to have been produced in the human subject when the milk of cows suffering from foot and mouth disease has been freely used without being boiled. There is no evidence to show whether this affection is of a specific nature or not, but it seems to consist in a derangement of the alimentary canal, accompanied by febrile disturbance, the presence of vesicles on the mucous membrane of the mouth and tongue, which having ruptured, leave superficial ulcerations and, at times, a herpetic eruption (small water blisters) about the exterior of the lips.

"II. That in a very large number of cases the milk of cows undoubtedly affected has been used without producing any noticeable effects. This absence of results may, though only to an inconsider-

* Twelfth Report of Med. Officer, Privy Council, p. 298.

able extent, have been due to the smallness of the consumption and the boiling of the milk."

Mr. Simon, chief medical officer of the Council, in summing up the results, thinks that "dilution of the milk and mere lapse of time may have to be taken into account, and that milk which after dilution or after some hours' delay does not infect might have infected if taken neat or fresh." He is "clearly of the opinion that the milk of cows affected with the disease ought not to be unrestrictedly sold for human consumption."

While admitting that the disease as seen in man or animals is rarely, if ever, fatal, we deem it needful and proper to warn our citizens from using such milk, particularly for the food of young children.

In regard to the use of flesh of slaughtered diseased cattle, we must say that undoubtedly large quantities of it have been eaten in London and its vicinity, and there has been, according to Dr. Thorne, "no instance of any disease having been reported to him as resulting from the use of such meat." This statement is very different from asserting that disease never occurs; and we think that the fact that meat has been taken from diseased cattle should be of itself enough to condemn it. No meat should ever be allowed to leave the shambles in any part of this State without thorough inspection and permission for sale being given by a properly qualified person.

OVERCROWDING OF TENEMENT HOUSES, AND WANT OF CLEAN STREETS, &C., IN BOSTON.

In the month of July the Secretary of the Board called the attention of the members to the dangers liable to happen in Boston, from overcrowding in tenement houses, and from a want of cleanliness in alleys and streets. By a vote of the Board, the following letter was sent to the proper authorities:—

(COPY.)

TO THE BOARD OF ALDERMEN, *Health Commissioners of the City of Boston*:

The State Board of Health desire, respectfully, to call the attention of the health authorities of the city of Boston to the fact that the owners and keepers of tenement and lodging houses are not complying with the provisions of an Act of the legislature of 1868, chap. 281, General Statutes of Massachusetts. A large proportion

of the unfortunate poor are crowded into buildings whose construction sets at defiance the laws of health, whose yards and privies are filthy in the extreme, and whose general condition is such as to render them liable at any time to become centres from which pestilence may extend in every direction.

Very respectfully, your obedient servant,

(Signed) GEORGE DERBY, M. D.,

Secretary of the State Board of Health.

Boston, July 11, 1870.

A reference to the report by the Secretary upon the health of the city of Boston will show the influence of this letter. It seems to have been small indeed.

SMALLPOX IN MASSACHUSETTS.

The certainty and commonly perfect innocuousness of vaccination have been established by the experience of nearly a century of its use. Overwhelming evidence has been presented recently by Mr. Simon (Twelfth Report of English Privy Council) that the fears of vaccination occasionally contaminating the system are really not well founded. There must be many now alive who have heard at least of the horrible results of smallpox ravages before Jenner lived. With all these well-known facts before us, it seems strange that any town could allow the pest to grow rampant as it has been recently allowed to become at Holyoke in this State. For over two months this loathsome disease has been spreading in that town, and now (Dec. 25th) infests every part of it. The Secretary has visited Holyoke and had an interview with the selectmen and physicians. At his suggestion, a thorough districting of the town was made, and every arm is to have its vaccine safeguard placed upon it. No amount of *disinfectants* can cope with this dire disease.

The only way to thoroughly drive it from the United States is by a national law, as in England, requiring every parent to duly register his child after having been duly vaccinated. Meanwhile the laws of our State in regard to unvaccinated children not being allowed to go to school, and other laws relative to infectious diseases must have been grossly neglected in Holyoke to have such an unhappy result as has taken place at that town, viz. : up to Dec. 31st one hundred and sixty-seven (167) cases of

smallpox have occurred, of which thirty-six (36) or about one-quarter proved fatal. There are doubtless many survivors also who have been disfigured for life by the disease. In connection with this statement, the Board draws attention to the fact that several of our correspondents (see Report on Health of Towns) allude to the indifference and neglect of the people in regard to vaccination as being quite general, and fraught with great danger to the people when the seed shall fall among them.

In the Massachusetts Registration Report for 1868, we find the following on vaccination:—

“In Ireland vaccination was made compulsory in 1863. Since that period the Irish Poor Law Commissioners have carried out the provisions of law and the whole population has been vaccinated. The results are seen in the following figures, from which it appears that the Irish physicians have banished the smallpox from their island as Saint Patrick is said to have banished the snakes. Whereas, in the periods 1830–40, 1840–50 and 1850–60, the respective annual average mortalities had been 5,800, 3,827 and 1,272, in the years 1864, 1865, 1866, 1867, 1868, they were 854, 347, 187, 20 and 19, respectively. In the first half of 1869 the whole number was three. The deaths from smallpox in Ireland since 1866 have been so few that it is fair to suppose the cases have been generally imported from abroad. The population being about five and a half millions, we should have, if equally well protected, about four deaths a year in Massachusetts.”

SPECIAL INVESTIGATIONS MADE UNDER DIRECTION OF THE BOARD DURING THE PRESENT YEAR.

The questions especially investigated either by individual members of the Board or by agents appointed by them are twelve in number. Some are of a more popular character and intended to diffuse information on sanitary matters among the people, while others are interesting to physicians chiefly. Most, if not all of them, however, contain more or less of the popular and also of the scientific element, and as such are commended not only to the notice of the legislature, but to that of every adult inhabitant in the State.

The following brief analysis is offered of these various papers:—

Poisoning by Lead.

By the Secretary, assisted by Prof. William Ripley Nichols, of the Massachusetts Institute of Technology, and by various Correspondents.

In this paper will be found correspondence from physicians in different towns of the State relative to their personal experiences. The essay is equally valuable to the student for the scientific thoroughness with which Professor Nichols has performed his part of the work, and to the citizen for the warnings it gives in regard to the employment of lead pipe for the conduction of water that is to be used for drinking or culinary purposes. It also presents facts regarding the danger incurred by those who drink cider or other acid drinks from faucets fastened with lead ; and other analogous facts tending to show the evil effects of cosmetics containing salts of lead.

Trichiniasis in Massachusetts.

By the Secretary.

The paper on this disease, which is caused by eating raw pork, or pork but partially cooked, is a frightful warning to the community. It should be carefully read by every parent when providing food for his family ; and the essential point of it, viz., the necessity of *thoroughly* cooking lean pork before placing it on the table, should be known and duly appreciated by every cook in the land.

Health of Towns.

Arranged by the Secretary, aided by our Correspondents.

This document, prepared from returns made by correspondents, contains facts and deductions therefrom. Among the returns specially noticeable may be named the influence of residence on river banks, near swamps, pigsties or foul privies ; details of wretched tenement houses (Boston) and stringent criticisms thereupon. In Brookline we see proof that the rich are more liable than the poor to some diseases ; and at Concord we have the evil influence of irregular flowing of lands by mill-dam corporations, and an admirable example of wise sanitary precautions used by a correspondent. At Hinsdale, the bad effects of overcrowding are found ; and at Hadley, the influence of too many shade-trees. In Northborough we have allusions to the effect of wet soil on the prevalence of consumption. One town has its threatening of future pestilence unless better

drainage be brought about by the citizens or by an active board of health. Suggestions in regard to infectiousness of consumption we have from Rockport. At Taunton our correspondent has opinions on the influence of a want of sunlight on the homestead. A gross neglect of vaccination is apparent in various towns, as Billerica, Holyoke,* Worcester, &c. The straw business as a cause of consumption appears at Upton. These are only a few of the variety of questions brought up by our correspondents. It is well for every one to look at his own town, and see if any nuisances exist there and afterwards do whatever can be done to remove any evil existing. The Board hopes eventually to have similar returns from all the towns. The continuation of such annual reports will tend to enlighten the public mind on all sanitary matters.

Charbon, or Malignant Vesicle, in Massachusetts.

By Arthur H. Nichols, M. D., of Boston.

This paper contains a *résumé* of the latest views on the idea of contagion. These views, though still in debate, are important as presenting one of the actual phases of thought on the all-important, but very profound questions involved in the terms "infection" and "contagion." While recommending therefore the paper to the consideration of our scientific investigators of disease, the Board feels that the practical suggestions made in regard to the necessity of cleanliness and of free ventilation are of equal value to the practical manufacturer and laborer. The suggestions also with regard to the free use of carbolic acid as a disinfectant should be known by all engaged in working on hair at Walpole and other towns, and they are worthy of serious consideration by every physician who is called to treat a case of charbon.

Typhoid Fever in Massachusetts.

By the Secretary, aided by our Correspondents.

This contribution to the etiology of typhoid fever made by various correspondents throughout the State, with the summary of inferences that can be drawn from the letters made by the Secretary of our Board is worthy of attention by every household. Pittsfield, knowing too well the truth of two of the

* See also special remarks on smallpox at Holyoke.

inferences, viz., that fetid smells and impure water can alike produce typhoid fever of a most virulent type, has now its able and efficient board of health that foresees the evils threatened, and by determined action or timely warning arrests trouble. The State Board of Health feels that it cannot give any better advice than that every town should have an equally active board of health, and every inhabitant should read carefully the various letters, and, after doing so, should make his or her own inferences as to the condition and wants of his or her own town. The paper is also submitted to scientific investigators in the belief that, at least, it adds somewhat to our knowledge of the causes of this destructive disease.

Homes for the People.

The Chairman of the Board, having been obliged to reside during the past six months in London, availed himself of the opportunity thus offered of studying the homes of the poor of that metropolis and of learning what is now doing by public and by private philanthropy and capital in the matter of providing better homes for the people.

His letter to the Board presents the results of his investigations in reference to this most worthy object. The Board commend to the attention of the citizens the practical workings of the Peabody, Coutts and Waterlow buildings in fostering habits of cleanliness, temperance and self-respect among the people. To the last-named company, as proving that capital can combine with philanthropy, and each reap abundant harvests, the Board would especially call attention. Never was there a fairer chance or a greater necessity for similar operations than now exist in Boston.

The other subjects of Convalescent Homes in the country for broken-down but not really diseased persons, the matter of the use, waste and danger arising from Sewage, the Board deem worth the careful consideration of all.

The walks with the police in London and Boston, in their terrible and disgusting revelations, are solemn warnings, and, although perhaps to some minds, may seem ill-adapted for a report from a State Board of Health, are nevertheless entirely in accordance with the principles laid down in our first Report, as those upon which the Board was determined to act, viz.:

that "nothing which pertains to Humanity in its widest sense will this Board deem foreign to its aims."

Alcoholic Drinks. Their use and abuse.

With information derived from correspondence throughout the world.

The law establishing the Board requires it "to examine into and report what in their best judgment is the effect of intoxicating liquors as a beverage upon the industry, prosperity, happiness, health and lives of the citizens of the State. Also what additional legislation, if any is necessary in the premises."

These inquiries the Board deem of the highest importance. For years they have been the sources of violent language, or of party zeal alike in the privacy of home life, and upon the political arena. For years public sentiment in the Commonwealth has fluctuated between the extremes of action and of reaction on this matter. Meanwhile it seems certain that, while throughout the State there is less drunkenness than formerly, it never was more rampant than now in Boston and some of the larger cities. This habit the Board believe to be infinitely deleterious "to the prosperity, happiness, health and lives of the citizens." The records of our courts, and the knowledge which every one has of its effects in the private family assure us of this fact. *The evil is enormous.* How to remedy it is the difficulty.

In the hope of being able to lift the question of the use and abuse of intoxicating agencies above the region of partisanship and to enable the people of the Commonwealth to know how, more or less generally, human nature tends, the world over, to use and at the same time to fall into the vice of immoderate indulgence in intoxicating drinks, a circular was sent to the American Ministers at foreign courts, and to the Consuls of all the principal ports on the globe. It was designedly made as brief as possible—because we hoped thereby to get a greater number of responses than a more elaborate programme would have obtained. The Board presents the correspondence from Europe, Asia, Africa, North and South America, the isles of the Pacific, as well as from the State at large in the hope that the effort has not been in vain. From representatives of the United States in foreign countries we inquired what are the kinds of intoxicating drinks used, and what amount of crime do they

produce. These two questions it was unnecessary to put to our medical correspondents in Massachusetts who are more especially cognizant of the effects upon public health. Every member of this Board, and indeed every citizen knows that intoxicating drinks are the direct cause of a very large proportion of all the crime which is committed among us.

The foreign correspondence is not yet wholly finished. Letters have arrived within the past few days. It will therefore be impossible thoroughly to analyze the whole in all their various bearings. We hope to do this at a future time. Meanwhile certain general inferences we think can be drawn from this correspondence.

First.—Wherever we go, we observe that man finds some drink to use as a stimulus. Some nations use immoderately the more fiery, more potent liquors, and the results are infinitely more disastrous than are noticed among other nations using a milder beverage.

Second.—It would seem that the Northern nations of Europe, more especially the inhabitants of the British Isles and their descendants in America, tend to use immoderately these more violent liquors. The more Southern nations, except in the Southern States of this republic, use either milder articles altogether, or if perchance the stronger ones are drunk, smaller glasses and fewer of them are taken. ●

Drunkenness is far less common among Southern than among Northern nations, but when it occurs is regarded with extreme aversion. It degrades its victims, in public estimation, in a far greater degree.

Third.—A curious physiological effect seems hinted at by some of our correspondents, viz.: that among Northern nations the vice of drunkenness is much more frequently the cause of violence and crime than in more Southern climes. In the North, men seem to become savage, wild and boisterous. The drunkard in the North beats his wife, and stabs his friend, or breaks into his neighbor's house under the influence of liquor. In the South he reels home rather happy in his insanity, and without any strong tendency to violence, or theft, or murder. We may add as a fact also that in *this* climate the Northern European cannot drink with impunity even that amount of alcohol he has all his life used in Europe.

Fourth.—It would seem from the correspondence that the practice of using stimulants is universal, and if unrestrained brings misery and death not only to him who indulges but often also to the community in which he lives.

If these conclusions are fairly deducible from such information as we have been able to collect from every part of the world, the question arises, what can we do to keep this universal tendency within proper bounds in Massachusetts?

The subject is, in some form, before the legislatures of all the States, and is everywhere recognized as one of difficulty. Men equally earnest in their desire to reach the evil differ in opinion as to the best means to be used. This Board can suggest no specific remedy: they have no sources of information which can give them any peculiar advantage in proposing the modification of existing statutes. The details of law are not within their proper province, but they do most earnestly desire and recommend that the legislature may devise some plan by which dram-shops, or tippling-houses may be summarily suppressed throughout the State.

Recognizing also that the love of strong drink becomes at times a real disease, and as such controls its victims as completely as insanity can ever do, this Board earnestly urges upon the legislature the establishment of inebriate asylums, to be held as insane asylums are now established and held, under State guardianship, in various parts of the Commonwealth.

Mortality of the City of Boston.

Prepared by the Secretary, assisted by Frank W. Draper, M. D., of Boston.

This paper is presented in the conviction that from it may be deduced inferences of great importance to the future health not only of the city but of that of the State at large. The Board hopes that similar "health districting" of the various towns in the Commonwealth will be undertaken by the local boards of health. No more valuable work could be inaugurated. If such investigations were carried on thoroughly and conscientiously by every nation in all their various townships, we should, in ten years, know more certainly about many *causes* of disease than the medical profession has been able by its own unaided efforts to arrive at during the centuries of its existence. The deductions made by our Secretary from the

●

tables of Dr. Draper are few compared with what may possibly be drawn from them, but although few, they unmistakably point to the fearful neglect of the city authorities of Boston in reference to the sanitary condition of the metropolis; and the terrible penalty for this neglect is daily and hourly paid at the present time by the sacrifice of human life.

The remarks of the Secretary on the fact that houses are now *allowed by the city authorities to be built on land in a certain portion of the city that must be eventually raised at an enormous expense*, the Board submits with deference to the taxpayers of Boston as worthy of their especial notice, in order that the evil may be promptly checked. Unless this be done, a deteriorated sanitary condition of the inhabitants of the district will be the inevitable result.

Ventilation of School-Houses.

By A. C. Martin, Architect, of Boston.

This paper is based upon scientific principles relating to ventilation, and presents plans for carrying out the design in a practical way.

In most of our school-houses the object seems to be to get heat enough at any rate, and if ventilation is considered at all it is regarded as of secondary importance. Our school-houses are charged with carbonic acid gas and animal effluvia which undermine the health of both teachers and scholars. The removal of such deleterious influences is surely greatly to be desired.

We deem it important to remind those who have charge of the warming and ventilation of schools that it is no easy or simple matter, in our variable climate, to maintain a uniform temperature, and at the same time renew the air with such frequency as health requires. No methods of warming and ventilating the two and three story school-houses which it is now customary to build in our large towns, can be reasonably expected to be otherwise than expensive, and whatever they may be, they need the constant care of intelligent persons to insure their proper working.

The plans of Mr. Martin are believed to meet the necessities of the case.

Mystic Pond Water.

By the Secretary, assisted by Prof. Wm. Ripley Nichols, Massachusetts Institute of Technology.

The Board commends this paper to the notice of the scientist as well as to that of the citizen. It shows how a pollution which, at first sight, it would seem must necessarily cause contamination to the drinking water of several towns is rendered by the alchemy of nature, at present at least, comparatively harmless. At the same time it forewarns us of what must certainly occur if we allow the present impurities of Mystic Pond to be increased, by new and more numerous nuisances in the form of the refuse of tanneries, &c., being thrown into it. For a still further reason, the Board urges removal even of the present small nuisance, because the very filth, which tends to contaminate, might be saved and used for beneficial purposes, whereas it is now lost and at the cost, perhaps, of human health and life. For it is undoubtedly true that the very refuse which may tend to contaminate the drinking water of the citizens of Charlestown and of other populous places, might be used as a fertilizer by the farmer, or perchance in some operations in the various manufactories of the State.

Air and some of its Impurities.

By the Secretary, assisted by Messrs. A. H. Pearson, H. B. Hill, and Charles Stodder.

This article comprises a contribution to our accurate knowledge, of the amounts of carbonic acid gas contained in various open places in the cities of Boston and Cambridge, compared with what is found in our schools, churches, halls, theatres, &c. It is a record of carefully conducted experiments, and will, we hope, commend itself to American and European investigators on the subject. It is interesting also to every one, even though he be not occupied with the scientific view of the matter, to observe how this deleterious gas collects in all badly ventilated places.

The letter from Mr. Stodder is a truthful statement of the views of an experienced microscopist, upon the difficulties connected with microscopic investigations relative to the "germ" theory of disease. Although it seems to teach us but little on that subject, it does us substantial service when it tends to

check the exuberant imaginations of many about "organic germs," of which we have heard so much the past year.

The practical suggestion also of the possibility of preventing the dust, of iron and steel filings, from flying about the air of machine shops, and thereby saving life by means of magnets, is worthy of the attention of master-machinists who desire to promote the well-being of their operatives.

*Health of Minors Employed in Manufactories of Cotton,
Woollen, Silk, Flax and Jute.*

By the Secretary, assisted by Frank W. Draper, M. D., of Boston.

This report is from the nature of the case imperfect. The difficulty in procuring the required information has been great. From many factories it has been found impossible to get returns. For this reason the subject cannot be said to be completely examined, and its great importance demands still further investigation.

Meanwhile it is gratifying to the Board to find that with these imperfect returns, there is no suggestion of the existence of greater mortality or sickness, among the operatives than in the State at large.

In reading this report the Board feels the great importance of the question, now much debated in Europe, as to the registration of disease. If every corporation in the State were obliged by law, under a penalty for non-performance of the duty, to make annual returns of the number of days lost by their employés by reason of sickness, and if all hospitals and dispensaries were required to give similar information, a great deal might be learned important to the future health of our citizens.

Sewing Machines.

Early in the year the Board took measures for careful investigation, as to the truth or otherwise, of the statement widely circulated, that constant labor by women on sewing machines moved by foot-power, was undermining health, and was productive of various complaints peculiar to women. They engaged a physician of experience and skill, and having a wide practice among the operatives of one of the cities of the State to report upon the subject. The importance of the matter is understood

by the Board, and they regret to say that only within the past few days has the gentleman found himself unable to perform the services agreed upon. At present, owing to lack of the time necessary to make a complete examination, it is impossible to do more than to promise information on this subject as soon as it may be obtained, and, if deemed of sufficient importance, some publication may be made before our next annual report.

EXPENSES OF THE BOARD.

It will be seen by the following statement of accounts that our Board has expended \$2,288.35, which is less than half of the sum which the legislature appropriated for our use in 1870.

We trust that the same liberality and the same generous confidence in the intentions of the Board will be continued in 1871. It is always necessary to have some reserved fund for extra work which may suddenly occur.

The Secretary has already in behalf of the Board asked for an appropriation equal to the sum granted last year. If this be allowed, we shall promptly enter upon new tasks and with renewed zeal; in full confidence that all money expended by us will in the end be amply repaid to the State.

All which is respectfully submitted.

HENRY I. BOWDITCH,
P. EMORY ALDRICH,
WARREN SAWYER,
GEORGE DERBY,
WM. C. CHAPIN,
RICHARD FROTHINGHAM,
R. T. DAVIS,

Members of the Massachusetts State Board of Health.

BOSTON, January 18, 1871.

EXPENSES OF STATE BOARD OF HEALTH—1870.

Postages and stationery,	\$429,28
Travelling expenses of Secretary,	57 59
Express charges and soldier messengers,	57 60
Printing,	100 86
Personal expenses of members while engaged in the duties of the Board,	148 29
Paid for special investigations,—	
Concerning Air,	271 66
Water,	200 00
Charbon,	125 00
Ventilation of school-houses,	125 00
Mortality of Boston,	255 00
Typhoid fever,	103 50
Health of factory operatives,	30 00
Furniture and philosophical apparatus,	98 92
Copying, translating, &c.,	210 90
Miscellaneous,	74 75
	<hr/>
	\$2,288 35

REPORT OF THE SECRETARY.

To the State Board of Health.

GENTLEMEN :—I have occasion to add but little to the record of the year's work which is presented in the accompanying reports.

An extensive correspondence has been kept up with all parts of the State, and many visits have been made to the different towns, for the purpose of consultation with the local boards of health.

I have lectured on subjects connected with public health in Amherst, Springfield, Boston, Worcester, Charlestown, Salem and Lowell. It gives me pleasure to assure you that everywhere I have met with evidence of the great interest which is felt in the operations of our Board by the selectmen of towns, members of the medical profession, and by the people generally.

Physicians are the natural guardians of public health. They know better than any other class in the community that many diseases are avoidable—that it is easier to keep well than to get well—that prevention is better than cure. These convictions have led them to co-operate most heartily in the inquiries undertaken by our Board. Two hundred physicians, in as many different towns, have contributed information on the special subjects investigated in the following pages. Many of these gentlemen are of eminence in their profession, and their practice and observation may be said to extend over nearly the whole territory of Massachusetts. In many instances the smaller towns have no resident physician. In the letters of our correspondents, as arranged for publication, I have separated the various topics, that each subject standing by itself might be the better understood.

The report of deaths from all prevalent diseases in the largest cities and towns, has been published every Wednesday during the year in the Boston Morning "Journal." I desire to express my thanks to the clerks and registrars who have aided me in collecting this information.

Very respectfully, your obedient servant,

GEORGE DERBY,
Secretary of the State Board of Health.

Boston, January 18, 1871.

POISONING BY LEAD PIPE

USED FOR THE

CONVEYANCE OF DRINKING WATER.

POISONING BY LEAD PIPE.

One of the questions addressed to our correspondents, in the circular of April 8, 1870, was as follows :

“ Have any cases of lead colic or lead paralysis occurred in your town or district, in which you have been able to trace the origin of the disease to water-pipes ? ”

The replies are from one hundred and seventy correspondents, in as many different places, and are as follows :

Yes,	.	.	.	.	.	.	.	41
No,	.	.	.	.	.	.	.	101
Doubt expressed,	.	.	.	.	.	.	.	20
No lead used in the town,	.	.	.	.	.	.	.	8

It is stated that in certain towns lead pipe is only used to convey water from springs, and that, when allowed to flow continually without plugs or stop-cocks, no harm has been known to follow.

The negative replies are very brief, and may be construed as meaning generally that no bad effects have been observed, rather than that, in the opinion of the writers, none may occur from the contact of drinking water and metallic lead.

The affirmative replies are direct and positive, and are usually accompanied by evidence. They occasionally refer to other accidental modes of poisoning by lead, as by hair-dyes, which are almost universally composed of acetate of lead and sulphur in various proportions ; also by cider and vinegar drawn through lead faucets.

Information relating to this general subject is given in the following extracts from letters of our correspondents :—

Ashland.—Three cases of lead poisoning through water-pipes are reported. Two, which occurred eighteen months ago, were in the same family: a father, aged sixty, and his daughter, aged twenty-four. The latter was the first affected, and her case for a considerable time was obscure. "She had no colic from first to last, but a series of indefinite ailments for which three of us physicians could assign no satisfactory cause; anæmia, pain in epigastrium, with nausea and vomiting, neuralgia occasionally in limbs and chest; bowels not constipated. Gastric ulcer, or carcinoma, were suspected. Lead poison was thought of, but there being no blue line on the gums, and no paralysis, the idea was given up. About the fifth month amaurosis occurred; but we groped in the dark three weeks longer. At this time her father was attacked with severe colic, and as the bowels were constipated, I examined the gums and found a well-marked blue line." The mystery was solved. The drinking water was brought into the house through fifty feet of lead pipe from a well in the stable. The daughter subsequently had wrist-drop. On removal of the cause, and with appropriate remedies, both father and daughter completely recovered.

The third case was in January, 1870. A French Canadian, aged thirty, exhibited the characteristic signs of lead poison, colic of great severity, constipation, blue line of the gums. The cause of these symptoms was found in the drinking water, which was brought into the house from a well, through forty feet of lead pipe. This water had also to flow through a box in the cellar, as large as a water pail, which was lined with lead. On removal of these causes, and with appropriate remedies, this case also recovered.

Amherst.—Two cases are reported; one of them having all the characteristic signs, — colic, constipation, partial paralysis, lead jaundice, blue line of gums. Analysis of drinking water in both cases yielded confirmatory evidence of the presence of lead, and both cases recovered on removal of cause.

"The water of our wells and springs in this neighborhood, especially in gravelly soil, is characterized by the presence, in large amount, of carbonic acid, and an almost absolute absence of sulphates."

Abington.—Our correspondent reports a case of lead paralysis, caused by drinking water conveyed four rods through lead pipe. Now under treatment.

Athol.—No cases have come under the immediate observation of our correspondent; but three cases in one family occurred in the

town two or three years ago, in which the disease was directly traced to lead water-pipes. In one of the cases there was partial paralysis.

Andover.—Lead water-pipes are very generally used, but no cases of colic or paralysis have resulted from it. In some instances, injury to health from their use was suspected. The pipes are often found much oxidized.

Attleborough.—In one instance, repeated attacks of abdominal pain ceased to recur after the removal of lead pipe from the well. In another, where the general health was undermined, with paralysis of the extensors of both arms, recovery commenced after the use of water conveyed through lead pipe was discontinued.

Barre.—Case of a middle-aged man, long sick and treated for rheumatism; finally there was partial paralysis of both wrists and ankles. He used water conveyed through lead pipe. Removal of the pipe, which was found to be very much corroded, and in some places nearly perforated, was followed by gradual, though incomplete recovery. He subsequently died suddenly, and, as reported, from pleurisy.

Brimfield.—One case reported with unmistakable signs of lead poisoning. Advised giving up use of water conveyed through lead pipe, but the man persisted in using it; and, finally, died unconvinced. A large proportion of people in this town use lead pipe for conveying water and do not suffer from it.

Bridgewater.—A case is reported of a boy eight years old, who had epileptiform convulsions, gradual decline, partial loss of speech and power of motion. The cause was not suspected for a long time, but when at last discovered and the lead pipe removed from the well, the boy completely recovered.

Nearly all lead pipes are now removed from wells in this vicinity.

Blackstone.—"I have been able, I think, to trace several cases of lead paralysis to the use of some of the hair preparations now in use. Cannot say that I have been able to trace it to water drawn through lead pipe."

Concord.—Our correspondent has met with no cases of lead disease from water pipes for some years past, but furnishes a report

of several which occurred in his practice in 1853, and expresses his opinion that similar instances of lead poison occur more frequently than is generally supposed, the cause being unrecognized. In the cases referred to, four persons were afflicted with lead disease, and brought near to death by drinking water conveyed through lead. The water was found to be charged with salts of iron from a meadow in which existed a bed of iron ore, and through its action upon the pipes, soluble salts of lead were produced in abundance. Removal of the pipe was followed by recovery of health.

Erving.—"The only cases of poisoning from lead pipe which I have observed here were caused by drinking cider drawn through a lead syphon which was allowed to remain in the barrel."

Essex.—One case reported. A man about fifty years of age was subject to attacks of epigastric pain and neuralgia. Cause not suspected until the extensor muscles of the arm became paralyzed. It was then found that he was drinking water conveyed twelve or fifteen rods through lead pipe. This being discontinued he gradually recovered.

Fitchburg.—A good many cases of lead disease, supposed to be from the use of lead water-pipes, occurred from ten to eighteen years ago, but none recently. The use of lead water-pipes is not wholly abandoned, but medical and popular discussion of the subject has greatly diminished their use, and very generally induced more caution.

Framingham.—Nearly all the members of one family have suffered from the various forms of lead disease, traced directly to the influence of water conveyed through lead pipe.

Gloucester.—"I have met with some three or four cases of disease occasioned by drinking water drawn through lead pipe. The symptoms, at first, were generally colic and constipation. This has been followed by partial paralysis.

"In one case the patient was the only one affected out of a large number who used the water. He had paralysis of the extremities, persisting for two months. That the lead poisoning was due to the pipe seems to me evident from the fact that a recurrence of the primary symptoms supervened upon resuming the use of the water drawn through the lead pipe, which speedily subsided on discontinuing its use."

Groton.—Several cases of lead poison from water are remembered. In one, the case was treated for three years unsuccessfully, the cause not being recognized. Recovery followed rapidly on removal of lead pipe used for conveyance of water thirty rods.

Hubbardston.—"I have seen, during my practice in this town, two cases of partial paralysis which I believe to be due to the presence of lead in the system ; and I am confident they occurred from the excessive and continued use of hair-coloring and hair-dressing preparations containing lead in solution. Both cases recovered on discontinuing their use."

Holyoke.—"In 1867 and 1868 a case was under my observation of gastric and intestinal derangement, with impaired use of the forearms and hands, which I suspected came from using water drawn through lead pipe. The service pipe was changed and the case was discharged cured some weeks afterwards."

Hyde Park.—A number of cases of suspected lead poisoning have been seen to improve after the removal of lead pipe from contact with drinking water.

Leverett.—Several cases have occurred. One of a lady who suffered for two years from partial paralysis of arms, and other equally marked signs of lead poison, and recovered her health after the removal of forty rods of lead pipe through which drinking water was conveyed. Another of a very similar kind, but in a different locality, with colic, great debility and finally "drop-wrist," from which recovery was speedy on removal of the lead pipe. Our correspondent has also met with cases of lead poison from the use of hair-dyes composed of sugar of lead and sulphur.

Our correspondent expresses the most decided opinions on the general subject of lead poison through water-pipes and hair-dyes, and believes that very large numbers of persons are unconsciously undermining their health through minute doses of lead administered in this way.

Monson.—One well marked case of lead poison in an excessive water drinker who got his supply through one hundred rods of lead pipe with very little fall. Lead water-pipe in very general use, but the above case the only one in which harm has been known to result from it. A fatal case of lead disease reported from the use of cider drawn from the barrel through a lead faucet.

North Andover.—A case of lead disease reported by our correspondent, from the use of a chain-pump, about which lead was used to prevent the water leaking down the chain.

North Adams.—In the course of twenty-five years' practice, some cases are recalled of illness supposed to be caused by water conveyed through lead pipe.

Northampton.—"The following cases of lead poisoning from the use of water drawn through leaden pipes are brought to the notice of your Board, as a matter peculiarly pertaining to the public health. The neighborhood in which the suffering family reside is very generally using water drawn through lead pipes, and is not disposed to accept the theory of poisoning from this source. The family of Mr. H., consisting of himself, wife, daughter and son-in-law, reside in Westhampton. Mr. H. removed to the farm he now occupies, seven years ago. Mrs. H. has lived on the place many years with her daughter; and the son-in-law, Mr. E., joined the family in November, 1868. Mr. H., aged fifty-seven years, had always enjoyed good health until the spring of 1869. Early in May he found himself losing flesh and strength, tormented continually with an unpleasant constriction and pinching in the abdomen and with pains in the extremities, not following the course of any of the large nerve trunks. June 19, he had an attack of colic so severe as to require the attention of his family physician. These attacks were repeated many times, and accompanied with obstinate constipation and nausea for many days. The abdomen was uniformly and considerably depressed and the blue line on the edge of the gums well marked.

"Mrs. H., aged fifty-seven, with good general health heretofore, had similar symptoms. Mr. E., the son-in-law, was still more severely afflicted, being extremely emaciated and feeble. His general appearance was like that of one suffering from malignant disease, and without the blue line and the family history to aid me in the diagnosis, I should have expected to find a cancerous development somewhere. The source of all this trouble was near at hand. The water which the family used was drawn from a well in the cellar through a one and a half inch pipe, extending from the bottom of the well to the sink in the kitchen, about forty feet. This same arrangement had been in use in this house for twenty-four years. The well was walled up with brick, fed from a spring at the bottom, and the water stood generally about six feet deep. The lead pipe passed through the wall above the surface of the water

then down to within six inches of the bottom of the well. The water in this well, as in the neighborhood generally, percolates through a gravel subsoil and is called *soft*. The surface of the pipe inside and out was coated with a carbonate of lead, and in several places the pipe was much eroded. The water was analyzed by the professor of chemistry at the Agricultural College, Amherst, and reported by him to give evidence of holding lead in solution, with an unusual quantity of free carbonic acid. These cases all recovered completely on removal of the cause of their illness and with appropriate treatment.

“This question may be pertinent. How does it happen that this water has been used by one member of the family (Mrs. H.) for twenty-four years without evidence of poisoning, and then all the family suffer about the same time? I have only one explanation to offer, which may or may not be correct. The wooden cover had become decayed and portions of it had fallen into the well. The decomposing wood had supplied the excess of carbonic acid gas necessary to act upon the leaden pipe.”

Northborough.—“I can recall eight cases of lead colic where the unmistakable cause was drinking water pumped through lead pipe; three cases from water from an aqueduct, two cases from water drawn from a well with a bucket made from a whitelead keg, and one case caused by drinking cider drawn through a lead faucet.”

Pepperell.—“I have now under treatment several cases of partial paralysis, caused, I have no doubt, by the use of water taken through lead pipe. The most prominent symptoms are these: *mental depression*; paralysis more or less complete of the extensor muscles of the forearm, with dropping of the wrists; inconvenience in walking over uneven surfaces, there being inability to extend the foot to avoid accidents; distinct blue line along the margin of the gums.

“In no instance had these persons come in contact with any form of lead in an unusual manner, except by lead pipe being used to convey water for domestic use. These cases are peculiarly interesting to me, witnessing, as I do, the effects upon different members of the same family.”

Rutland.—“Lead pipes for pumps and aqueducts are in universal use. No instance of lead colic or paralysis has occurred to my knowledge in the last twenty years.”

Sherborn.—"I remember but one case in which poisoning from lead water-pipe was suspected. There was temporary paralysis of the extensor muscles of the arm and the blue line on the gums. The patient was a boy and made a good recovery after treatment and the removal of the lead pipe. No other member of his family was affected. Lead pipe for the conveyance of water is very generally used here."

Shelburne.—"I have known four cases of lead colic, two of them complicated with paralysis. Three recovered and one died. All of these persons used water from lead pipes."

Sterling.—"I am convinced that the universal use of lead pipe for water conduits has had a prejudicial effect on the health of the people of this town in years past and evidences of lead poisoning are apparent in some patients now under my treatment."

Sudbury.—"In forty years' observation no cases of lead colic or lead paralysis have been seen which could be directly traced to water pipes, but our correspondent believes lead to be an unsafe metal to be used for the conveyance of water, and is recommending its removal and the substitution of other materials free from the suspicion of danger."

Taunton.—"A few cases of paralysis from the absorption of lead, supposed to come from lead pipes and cisterns, have been observed."

TeWKsbury.—"A case is reported of lead poisoning from long continued use of a hair-dye containing sugar of lead."

Uxbridge.—"No case of lead poisoning from water pipes known to have occurred in Uxbridge, but in a neighboring town two cases were recently seen by our correspondent. Water was brought from a well through lead pipe, and produced in one instance lead colic and in the other "drop-wrist" before the cause was discovered. The water treated with sulphuretted hydrogen showed the presence of lead in abundance."

Upton.—"One case reported by our correspondent as distinctly traceable to lead-pipe water. Other cases of colic and partial paralysis have occurred in which this cause was suspected but not proved."

Ware.—A case of neuralgia in which lead disease from water pipes is suspected, now under observation. Our correspondent in Ware reports a case of lead disease, although not from water pipes, which is curious and instructive.

“An old gentleman, a farmer, had colic, constipation and finally drop-wrist. It took me a long time to find out from whence the lead which had evidently caused these symptoms could possibly be obtained, as the water was from an old oaken bucket and no paint was used about the house or on any of the cooking utensils. But I made every inquiry and at last discovered that the old man was fond of vinegar and water, sweetened, for a drink; and thinking it nicer freshly drawn, was in the habit of going to his barrel and drawing a little into his glass through a lead faucet!

“This source of danger in his case came very near being an unsolved mystery, but happily it was at last made manifest.”

Watertown and Belmont.—Lead disease occasionally seen and almost without exception in the form of colic. Several cases reported. A middle-aged man, a shoemaker, lived with his wife for three years in a house supplied with water through lead pipe. He had no family. The wife, with more active habits, never showed distinctive signs of lead poison, but was never quite well. The husband had lead colic of the most violent and obstinate character. Another case was of a little girl who was constantly drinking from the faucet which supplied the basin in her mother's chamber. The lining of the tank from which the water was drawn was found to be oxidized.

In a second letter our correspondent says: “I think I stated that I had seen the effects of lead poisoning manifested almost invariably in the form of colic. I now recall a single exception, which was the case of a lady who suffered from a neuralgic affection of the limbs, especially the arms, which were lame, painful and weak. The water she had been in the habit of drinking was found to contain a large proportion of lead. The use of lead-water was discontinued and the symptoms eventually disappeared.

“One case more of suspected lead affection, that of a woman who was teased and annoyed for a long period by abdominal pains, not severe and sharp like those of ordinary colic but dull and wearing. I believed the cause of this trouble to be the use of water which came from a painted roof. She recovered perfectly.”

Wakefield.—Two families affected; both entirely recovered on

removal of the lead pipe. In one of these cases there was paralysis of the extensor muscles of both hands.

Webster.—"There have been several cases of colic and a few cases of paralysis in this vicinity, directly traceable to the use of water drawn through lead pipe. A case of lead paralysis caused by drinking cider drawn through a lead faucet was also under my observation a few years ago."

Waltham.—Several cases of lead poisoning from water pipes occurred in this town in the practice of the late Dr. Horatio Adams, and were published by him in the Transactions of the American Medical Association, Vol. 5. Our correspondent has recently seen a case which was caused by water drawn through lead pipe from a brick cemented cistern.

Westminster.—Two cases of lead palsy traced to the use of water drawn through lead pipe. Extensor muscles affected. One was relieved by omitting the water; the other was incredulous as to the cause of his trouble, and has been permanently injured. He has had "wrist-drop" for several years.

West Boylston.—Some cases of lead disease from water-pipes have been seen, but they are not common. People are beginning to understand that water confined in lead pipes is dangerous, and are more careful than formerly. Our correspondent has seen paralysis, colic, a blue streak around the gums, costiveness and extreme emaciation caused by drinking water that had been stagnant in lead pipes.

Wilbraham.—One case of facial paralysis observed which was supposed to be due to the use of hair-dyes.

Worcester.—No cases of lead poisoning from water pipes observed since the introduction of "city water." Before its introduction many cases of colic and partial paralysis were seen, apparently due to lead pipe in wells. On removal of the suspected cause the symptoms disappeared.

Wrentham.—"Instances have occurred where I think I have been able to trace the origin of disease to lead water-pipes. There is a hilly section where a dozen families are supplied with water from an excellent spring, a fourth of a mile above them. It is brought through lead pipe. These houses are also supplied with

good wells. I think I am correct in saying that every one who uses the water conveyed through the lead pipe for any time is injured by it. The complaints are varied ; generally abdominal pain and neuralgia. Lately I have in a measure dissuaded the people from its use. The flow is not constant ; it only moves as it is drawn upon."

In addition to this information directly from the towns, there are many similar cases reported in the "Boston Medical and Surgical Journal" as having occurred in Massachusetts during the past fifteen years. They are of the same general character as those already given, and it is therefore unnecessary to reproduce them. They may be found in Vol. LIV. p. 21 ; Vol. LV. p. 428 ; Vol. LVI. p. 422 ; Vol. LVII. p. 368 ; Vol. LIX. p. 99 ; Vol. LXI. p. 480 ; Vol. LXXVI. p. 37.

The Transactions of the American Medical Association, Vol. V., also contains a report on the subject, with many interesting cases occurring in the neighborhood of Boston, by the late Dr. Horatio Adams of Waltham.

The special action of the water of Lake Cochituate (Boston water) on lead pipe, and the amount of lead it is capable of dissolving under various circumstances, have been investigated, by request of the State Board of Health, by Mr. Wm. Ripley Nichols, Assistant Professor of General Chemistry in the Massachusetts Institute of Technology, who presents the following

REPORT:

GEORGE DERBY, M. D., *Secretary of Mass. State Board of Health:*

DEAR SIR,—At your request I have made a number of determinations of the amount of lead contained in Cochituate water under the ordinary circumstances of its use ; and in this connection I would present the following statement with regard to the action of water on lead in general:—

Perfectly pure water, in the absence of air, has no action on metallic lead ; if, however, lead be immersed in rain water or in ordinary distilled water there is almost immediate action, and if, after the lapse of a few minutes, the liquid be agitated, there will be seen an abundance of white scales of the hydrated oxy-carbonate of lead. This violent action seems to be due, in considerable measure, to salts of nitrous acid, especially nitrite of ammonium, always present in such water, and to be effected by the formation

of some nitrous compound of lead which is more soluble in water than the oxy-carbonate, into which it is almost immediately converted by the carbonic acid of the air or by that which is dissolved in the water. In all waters also, hard and soft, there appears to be formed at first an oxide, (or hydrate,) and this also is more soluble than the oxy-carbonate; if lead be partially submerged in water, there will always be found on it, after some days, at the surface of the liquid, yellowish white crystals of hydrate of lead, along with the crystals of the oxy-carbonate. The bluish gray coating which forms on the surface of lead exposed to a moist atmosphere is a practically insoluble suboxide.

It may be asserted that in all natural waters lead suffers corrosion to a greater or less extent. All the conditions upon which this action depends are not accurately known, so that we cannot say *a priori* whether a given water will act slightly or violently on the metal with which it may come in contact; moreover, there is considerable diversity of opinion as to the effect, in this regard, of the presence of various individual salts; still, it seems to be very generally agreed that the influence of sulphates, phosphates and carbonates is protective, not only because the presence of these salts lessens the power of the water to dissolve oxygen and carbonic acid from the air, but also on account of the formation of a coating of lead compounds, which coating is but very slightly soluble itself, and at the same time prevents the direct contact of the water and the metal.

In regard to the solubility of the various salts of lead: one part of the sulphate requires 20,000 parts of cold water for its solution (Fresenius); the carbonate requires 50,000 parts of water (Fresenius); the oxy-carbonate is but very slightly soluble (Yorke), while the phosphate is altogether insoluble (Mitscherlich, Fresenius). The solubility of the carbonate and oxy-carbonate is so slight, that it is ordinarily stated that water contaminated with lead from lead-pipes or tanks may be rendered harmless by standing for a certain length of time exposed to the carbonic acid of the air, and Faraday proposed (Rep. Chim. App., I., 498,) the addition of powdered chalk to water collected from a lead-covered roof, asserting that the lead was thus entirely precipitated and the water made potable. With regard to the other salts of lead, the suboxide is absolutely insoluble (Horsford and others), the hydrated oxide is soluble in 7,000 (Bonsdorff) or 10,000 to 12,000 (Yorke) parts of water, while the chloride and nitrate are much more soluble, the chloride dissolving in 135 parts of cold water (at 12.5°C., Bischof), and the nitrate in about three parts of water at the ordinary temperature.

The greatest amount of protection seems to be afforded by the presence of carbonate of lime held dissolved by an excess of carbonic acid, a coating of carbonates of lime and lead being formed in such case; yet some observers assert that a large excess of carbonic acid exercises a solvent action on carbonate of lead (see Miller's Inorganic Chemistry, under Lead). Other observers deny this fact (see Noad.—Chem. Soc. Jour. IV., 1852, pp. 20–26). The influence of nitrates and chlorides is felt to be pernicious; organic matters, which under certain circumstances cause corrosion of the metal, as they contribute to the formation of a difficultly penetrable coating, are to be classed with the protective agents.

In the distribution of water through lead-pipes, there are other circumstances which exert more or less influence on the action of the water on these pipes. The corrosion is recognized to be more considerable where the pipe has been sharply bent, where other metals, as in the case of solder-joints and stop-cocks of metal or alloy, come in contact with the lead, and where the water is transmitted through the pipes at an elevated temperature. In regard to the action of iron-rust coming from the mains, authorities differ; Horsford distinctly states (Proc. Am. Acad., II., 64,) that hydrated peroxide of iron in water is not reduced by lead, and consequently that we "may infer the freedom from corrosion of leaden pipes connected with iron mains, as far as the reduction of the pulverulent peroxide of iron may influence it;" Hayes, on the other hand, asserts that the ochreous deposit from the iron mains *assists in the corrosion*. It is a question whether there may not be a certain galvanic action between the iron-rust and the lead, or even between the coating of lead compounds and the lead itself; it is, moreover, well-known that if a bit of mortar or plastering falls into a lead-lined tank, or is carried into a lead-pipe, there is rapid corrosion in its immediate vicinity,—so that the influence of carbonates may not be altogether for good.

When the introduction of Cochituate water into Boston was under discussion, Professor Horsford of Cambridge made a series of experiments with regard to the action of the Cochituate, as well as of other waters, upon lead (see Boston City Documents, 1848, Nos. 18 and 32; also Proc. Amer. Acad., II., p. 64). He concluded that lead pipes could be used with safety for its transmission, and that the coating formed would be to such an extent insoluble and impenetrable, that after a certain time the action of the water would be practically nothing. These experiments in the laboratory have a certain value, yet too much importance must not be given to them, performed, as they are, with small quantities of water and

with a limited amount of metallic surface, and with the relative amounts of the two so different from those that are brought together in actual practice. Indeed, experience has shown that some waters, which in the laboratory seemed to corrode lead but slightly, really act very violently on the pipes through which they are conveyed.

With regard to the action of the Cochituate water on lead, we should infer from the small quantity of chlorides and nitrates, and from the proportionally large quantity of carbonates,* that this action would not be very considerable, and we are now in a position to determine from the actual experience of so many years how much it really amounts to. I have tested many samples taken from the pipes under various conditions, and have never failed to find indications of the presence of lead. The following *quantitative* determinations were made:—

No. 1.—Water dipped from the upper part of Cochituate Lake in a glass jar, August 31st, 1870.—1,000 c. c. of this water failed to give indications of the presence of lead.

No. 2.—Water from one of the drinking-fountains on Boston Common, July 20th.—100,000 parts of this water contained 0.0415 parts metallic lead, equivalent to 0.0242 grains to the U. S. gallon of 231 cubic inches.

No. 3.—Water from private residence, No. 137 Walnut Avenue, July 19th.—The water is delivered through a hundred feet or more of tin-lined pipe, and then through 10 or 12 feet of lead pipe. The pipes have been in

* Professor Silliman's analysis of the water was as follows: No. I. being from the part of the lake from which the aqueduct starts; No. II. from the other, the upper, end of the lake.

	I.	II.
Chloride of Sodium, . . . . .	.0323	.2540
Chloride of Potassium, . . . . .	.0380	—
Chloride of Calcium, . . . . .	.0308	—
Chloride of Magnesium, . . . . .	.0764	—
Sulphate of Magnesia, . . . . .	.1020	—
Sulphate of Soda,	—	.0843
Sulphate of Alumina,	—	.0146
Alumina, . . . . .	.0800	—
Sulphate of Lime and Silica,	—	.5700
Phosphate of Alumina,	—	.1700
Carbonate of Magnesia, . . . . .	.0630	.2560
Carbonate of Lime, . . . . .	.2380	.3860
Silica, . . . . .	.0300	—
Carbonate of Soda, equivalent to nitrates and crenates, and loss, . . . . .	.5295	.4757
	<hr/> 1.2200	<hr/> 2.2106
Carbonic Acid, average cubic inches to gallon,	10.719	4.549
(See Water Commissioners' Report, Boston, 1845.)		

I find that the water as drawn from the pipes in the laboratory of the Institute contains 0.217 grains of chlorine to the United States gallon, and a mere trace of nitrates.

use some six months.—100,000 parts of the water contained 0.0342 parts metallic lead equivalent to 0.0290 grains to the gallon.

No. 4.—Water from hot water pipes of same dwelling-house as No. 3, July 21st. This water passes through 40 additional feet of lead pipe, through a lead-lined tank and through an ordinary copper boiler.—100,000 parts of this water gave 0.191 parts metallic lead, equivalent to 0.112 grains to the gallon.

No. 5.—Water from the Chemical Laboratory of the Massachusetts Institute of Technology, drawn June 25th, early in the morning, after standing some 14 hours in the lead pipe which is about 150 feet long and has been in use several years.—100,000 parts of this water contained 0.098 parts metallic lead, equivalent to 0.057 grains to the gallon.

No. 6.—Water from the same pipes as No. 5, after running out enough to clear the pipes.—100,000 parts of this water gave 0.0307 parts metallic lead, equivalent to 0.0179 grains to the gallon.

No. 7.—Water from private residence, No. 8 Sawyer Street, Sept. 20th. The water had been let into the pipes only four days previously, and, at the time the sample was taken, had remained in the pipes for three or four hours. The pipe (lead) is some fifty feet in length.—100,000 parts of this water gave 0.073 parts metallic lead, equivalent to 0.0427 grains to the gallon.

No. 8.—Water from private residence, Kendall Street, Sept. 26th. This water was let into the pipes some four months since, and none had ever been drawn previous to this time.—100,000 parts of this water gave 0.0937 parts metallic lead, equivalent to 0.0547 grains to the gallon.

I would also record the following determinations.*

No. 9.—MYSTIC WATER from private residence, No. 12 Adams Street, Charlestown, 7½ o'clock A. M., Sept. 6th. There are about 50 feet of lead pipe which have been in use for 2½ or 3 years. Very little water had been drawn since July 1st.—100,000 parts of the water gave 0.120 parts metallic lead, equivalent to 0.0695 grains to the gallon.

No. 10.—MYSTIC WATER from Kidder's Chemical Works, Charlestown. Drawn 7 A. M. Sept. 6th, after remaining 13 or 14 hours in the pipes. Considerable quantities of water are used, and the pipe, 200 feet in length, has been in use four or five months.—100,000 parts of this water gave 0.120 parts metallic lead, equivalent to 0.0695 grains to the gallon.

* In all cases the lead was weighed as sulphate. Two liters of the water were evaporated to fifty c. c., with previous addition of nitric acid, and filtered. The incinerated filter was treated with nitric acid, the excess of acid driven off, the residue taken up with water and the solution filtered through a minute filter into the mass of liquid to be tested. Sulphuretted hydrogen was now passed through the liquid which was allowed to be only slightly acid, the precipitated sulphide of lead was collected on a filter, moistened with nitric acid, treated with a drop of dilute sulphuric acid and subsequently ignited cautiously with the filter. To avoid error from reduction to metallic lead, a second treatment with nitric acid and dilute sulphuric acid took place, followed by ignition with proper precautions.

In view of the foregoing quantitative determinations (Nos. 1 to 8) and of a number of qualitative tests, from conversation with men of experience engaged in the plumbing business, and from personal examination of various samples of lead pipes which have been in actual service, I feel justified in asserting:—

(1.) That Cochituate water which has passed through lead pipes is never absolutely free from lead.

(2.) That when the water is first introduced into the pipes, there is more action on the pipes, as far as contamination of the water is concerned, than subsequently, but that after a few days' service the quantity of lead in the water is practically very small.

(3.) That there is always more lead in the water after it has stood for some hours in the pipes than when it is allowed to flow freely.

(4.) That when the water passes through a lead-lined tank it will be likely to contain in solution or suspension a more considerable quantity of lead salts, from the fact that the lead is corroded more rapidly on the sides of the tank at the surface of the water. Moreover, in such tanks there is generally a considerable extent of surface of contact between solder and the lead.

(5.) That in the introduction of water into the pipes, the first effect is the tarnishing of the brightness of the lead due to the formation of oxide or suboxide; that there begins to form, almost immediately, a coating consisting on the *outside* of a brown and, at first, rather loose deposit (the color of which is not due to iron-rust as is ordinarily supposed, but to organic matter), and *underneath* of a white deposit composed mainly of carbonate of lead; that this coating increases with time in firmness and also in thickness, but that the rate of increase is so slow that practically the pipes used for conveying *cold* water, do not wear out and become unserviceable except from some accidental circumstance, as the freezing of the water, or, as is often the case where the pipes are laid underground, from corrosion from the outside or from a cause immediately to be mentioned. That, however, the pipes even under ordinary conditions would eventually wear out, I have no doubt, as there seems to be no limit to the action. I have indeed a specimen of a pipe which, being in contact with cold water only, for a period of fifteen years, was so corroded in the vicinity of a solder-joint as to be eaten through, and along the pipe there is a thick coating consisting almost entirely of carbonate of lead (with organic matter, a little carbonate and sulphate of lime and a trace of oxide of iron) which has penetrated the pipe in some places to the depth of 1-15 of an inch and more. There is one other circumstance contribut-

ing to the wear of cold-water pipes which is not to be overlooked. The water is delivered in many cases under such a pressure that the pipes tend continually to expand. The effect of this is often to strain the pipes so as to form longitudinal seams or grooves of greater or less length and the corrosion taking place under such favoring circumstances more rapidly, sometimes extends through the pipe, which is thus rendered unserviceable by a combination of chemical and mechanical action.

(6.) That pipes used to convey *hot* water are corroded more or less rapidly, a deposit similar to that in the cold-water pipes being formed, and the corrosion manifesting itself most decidedly in the vicinity of the solder points, and where the pipe is sharply bent. Whether the iron-rust, coming from the *water-backs* in which the water is heated, contributes to produce this effect, I am not prepared to say. The disarrangement of the particles of the lead and the change in its mechanical structure, brought about by the alternate and unequal contractions and expansions to which it is subjected, must present more favorable opportunity for the corrosive action due simply to the passage of the water through the pipes.

In connection with this report, I would present a list of the "literature of the subject," which, although not pretending to completeness, may be of service to any one interested in the matter.

Vitruvius.—De Architecturâ. Liber VIII., Cap. 6. De ductionibus aquarum. Ed. Schneider. Lipsiæ, 1807. Vol. I., p. 227.

Galen.—De Compositione Medicamentorum secundum Locos. Ed. Kühn. Lipsiæ, 1826. Vol. XII.

Lambe.—Researches into the Properties of Spring Water. 1803.

Guyton-Morveau.—Ann. de Chim. LXXI. (1809), p. 197.

Scudamore.—Analysis of Water of Tunbridge Wells. 1816.

Thomson.—Appendix to preceding; also Edinburgh Med. and Surg. Jour. XII., p. 495.

Beck.—Elements of Medical Jurisprudence. Albany, 1823. Vol. II., p. 315.

Bostock.—Report of the Commissioners appointed to inquire into the State of the Supply of Water in the Metropolis. London, 1828.

Yeats.—Hints on a mode of procuring soft water at Tunbridge. Jour. of Science. XIV., p. 352.

Comte de Milly.—Rosier. Obs. sur la Phys. XIII., p. 145.

Wall.—Trans. Lond. Coll. Phys. II., p. 400.

Hall.—Pogg. Ann. XIV., p. 145.

Yorke.—Phil. Mag. (3) V. (1834), pp. 81-95. Also, Pogg. Ann. XXXIII. (1834) pp. 110-112.

Siebold.—Pharm. Centr.-Bl. 1835, p. 831. Also Buch. Rep. III, pp. 155-179.

- Bonsdorff*.—Pharm. Centr.-Bl. 1836. p. 520. Also Pogg. Ann. XXXII., p. 573; Buch. Rep. V., pp. 55-59.
- Nevius*.—Pharm. Journ. Trans. X., 595.
- Méral*.—De la Colique Metallique.
- Phillips*.—Report from the Select Committee of the House of Lords to inquire into the Supply of Water for the Metropolis. London. 1840.
- Christison*.—Trans. Roy. Soc. Edinb., XV., 2 (1842) p. 271.
- Treatise on Poisons. 1st Amer. Ed. from 4th Edinb. Philadelphia, 1845.
- Dispensatory. Phila. 1848.
- Dana, S. L.*—Report of Joint Special Committee, &c. Lowell, 1842; also an appendix to his Translation of Tanquerel on Lead Diseases. Lowell, 1848.
- Morson*.—Pharmaceutical Journ. II., (1842) p. 355.
- Pareira*.—Treatise on Food and Diet. London, 1843.
- Elements of Materia Medica and Therapeutics. 3d Edition, London, 1849.
- Phillips*.—Chem. Gaz. 1845.
- Silliman*.—Report and Analysis of the Waters, with "Report of Water Commissioners." Boston (1845).
- Yorke*.—Phil. Mag. XXVIII., (1846) pp. 17-20.
- Report of Consulting Physicians on the Action of Cochituate Water upon Mineral Substances. City Document No. 18, Boston, 1848; containing a report by A. A. Hayes, M. D., also Prof. Horsford's partial reports, 1, 2 and 3.
- Report of Water Commissioners on the Material best adapted for the Distribution Water-Pipes. City Document No. 32. Boston, 1848, containing Prof. Horsford's Reports.
- Horsford*.—Boston City Documents 1848, Nos 18 and 32; Proc. Amer. Acad. II, p. 64; Chem. Gaz. VII., pp. 295-298.
- Hayes*.—Boston City Document No. 18, 1848.
- Taylor*.—On Poisons. London, 1848. Guy's Hospital Reports. VI.
- Jackson*.—Essay on Lead Pipes used as Conduits for drinking-water, contrasted with pure block-tin pipes. New York, 1852.
- Buckler*.—Amer. Jour. Sci. (2) XIV., (1852) p. 267.
- Graham*.—Chemical Report on the Supply of Water to the Metropolis. Jour. Chem. Soc. IV., (1852) p. 401.
- Noad*.—Jour. Chem. Soc. IV., (1852) pp. 20-26.
- Smith*.—Jour. Chem. Soc. IV., (1852) pp. 123-133.
- Elsner*.—Chem-tech. Mitth. 1854-1856, p. 24.
- Medlock*.—On the Action of certain Waters on Lead. Rec. of Pharm. and Therap of Gen. Apoth. Comp. London, 1857, part 2, p. 33.
- Phil Mag. XIV, p. 202; also Jour. de Pharm. (3) XXXIII, p. 237; Journ. Prac. Chem. LXXII., p. 277; Dingler's Polytech. Jour. CXLIV., p. 284; Arch. ph. nat. XXXVI, p. 354.
- Die Wasserleitung Berlins* 1857.
- Sicherer*.—Dingler's Polytech. Jour. CXLIV, p. 284.
- Lindsay*.—Edinb. New Phil. Jour. IX., (1859) p. 245. Abstr. in Br. Assoc. Rep. 1858.

- Faraday*.—Rep. Chim. Appl. I., p. 498.
Langloise.—Journ. de Pharm. (4) I., p. 99.
Stefanelli.—Zeitschr. Ch. u. Pharm. 1860.
Nichols, J. R.—Boston Med. and Surg. Jour. LXIII., p. 149.
Calvert.—Chem. News. IV, (1861) p. 172 ; also Dingler's Polytech. Jour. CLXII., (1861) p. 220.
Ludwig.—Die natürlichen Wasser. 1862.
Silliman.—Report on Mystic Pond. Charlestown. 1862.
Kersting.—Riga Water Supply. Dingler's Polytech. Jour. CXI.IX., p. 183.
Varrentrapp—Mitth. f. den Gewerbeverein d. Herzogthums Braunschweig. 1864. p. 27. Also Dingler's Polytech. Jour. CLXXV., p. 286.
Pettenkofer.—Baier. Kunst u. Gewerbebl. 1864. p. 682 ; also Dingler's Polytech. Jour. CLXXV., p. 283.
Stalman.—Dingler's Polytech. Jour. CLXXX. (1866) p. 366 ; also Zeitsch. f. Ch. 1866, p. 416.
Report of the Joint Special Committee on a Supply of Water for the City of Lowell. Lowell, 1869, p. 74.
Kirkwood.—Collection of Reports and Opinions of Chemists in regard to the use of Lead Pipe for Service Pipes. New York, 1859. 8vo.
Consult also—
Amer. Jour. Sci XXXIV., (1838) p. 25 ; XLVI., (1844) p. 398 ; XXXII., (1861) p. 115.
Miller's Elements of Inorganic Chemistry ; 4th Edition, (London) p. 714.
Brande.—Dictionary of Materia Medica and Practical Pharmacy.
Wood and Bache.—U. S. Dispensatory. 13th Ed. Phila., 1870.
Graham, Otto.—Lehrbuch. 1863. II., 3, p. 311.
Bolley.—Handbuch d. chem. Technologie, 1862. Vol. I., p. 95.
Graham.—Elements of Chemistry.
Brande and Taylor.—Chemistry,—and various other text-books and treatises on Chemistry.

Respectfully submitted,

(Signed)

WM. RIPLEY NICHOLS.

MASS. INSTITUTE OF TECHNOLOGY, }
 BOSTON, Oct. 20, 1870. }

From the evidence presented in the preceding pages, it seems reasonable to believe that the use of lead pipe for the conveyance of drinking water is always attended with a certain degree of danger, because such water always contains lead ; and that this danger varies in degree with the character of the water conveyed and the susceptibility to lead poison of those who drink it.

The chemist can say that water containing air (or natural water) always acts upon lead ; but he cannot say that a certain kind of water will, under all circumstances, take up and convey

in solution, only a certain proportion of lead. The physician finds it equally impossible to say that a certain proportion of lead in water will hurt no one.

From these two shifting elements of difficulty come all the doubt and obscurity which have made the influence of lead-pipe-water a disputed question.

How much lead can we habitually take without injury? No one would voluntarily add it in ever so small amount to the water of the spring, well, or lake which supplies his drink, yet thousands and even hundreds of thousands of people in Massachusetts do constantly receive it in very minute amounts without manifest injury.

No well authenticated instance of lead poisoning from the Boston water has come to our knowledge, although lead pipe is almost universally used for its distribution. The same statement may be made as regards Charlestown and Worcester, and is doubtless true of other large cities and towns supplied by water works from lakes of great purity. We may conclude from experience and observation that the character of the water in these cities is such as to dissolve lead in so small amounts as to be generally harmless,—and we use the word “generally” advisedly, because although paralysis, and wrist-drop, and the most distinctive signs of saturation with lead have not been observed, it does not therefore follow that minor obscure ailments, particularly of the nervous system, have not been aggravated or even caused by this subtle poison. There are a great many cases of neuralgia, of (so-called) rheumatism, and of dyspepsia, whose causes are unknown.

When we see that Professor Nichols finds one-ninth of a grain of lead to the United States gallon (equal to one-eighth of a grain English gallon), in the hot-water pipes of a private house in Boston, and remember the possibility of such water being habitually used for cooking purposes, it is well to be cautious in giving it a good character under all circumstances.*

But if the lake water of the cities mentioned, is generally incapable of dissolving a dangerous proportion of lead, it is

* A case of lead poisoning recently occurred in the city of New York, which was traced to the use of Croton water (whose character has been thought safe), drawn from the hot-water pipes after standing in them all night. In this water “cracked wheat” was soaked every morning, preparatory to boiling.

equally certain that the water of springs and of wells is very often ready to dissolve an amount which will produce dangerous disease.

The chemical evidence already presented shows that it is so difficult as to be practically impossible to say, even when we know the constituents of the water, whether it will dissolve dangerous amounts of lead until it has been actually tried by domestic use and for considerable periods of time.

It is well that we should have some idea of what have been found to be dangerous amounts of lead for habitual use.

Dr. Angus Smith says that one-fortieth of a grain per gallon will affect some persons, while one-tenth of a grain may be required for others. Dr. Parkes, a high English authority, thinks that any quantity exceeding one-twentieth of a grain per gallon must be regarded as unsafe. These opinions are also held by Professor Graham, Dr. Taylor and other equally known chemists and physicians. Dr. Adams, of Waltham, reports a case of poisoning in which only one-hundredth of a grain per gallon was found in the water. In the celebrated case of the poisoning of the family of Louis Philippe by drinking water which had been stored in a lead tank, the amount of lead was seven-tenths of a grain per gallon. This quantity affected thirty-four per cent. of those who drank it.

The susceptibility of individuals to the action of poisons, whether metallic or non-metallic, is known to differ exceedingly. Many persons pass half their lives in ignorance of their own peculiarity in this respect, and then have revealed to them by some lucky accident that what to their neighbors has been harmless, has been to them for a long term of years the source of great discomfort or illness. In our reports from the towns it is evident that in numerous cases water containing lead in solution has been insidiously undermining the strength of people who never suspected the cause until some one of their family, still more susceptible to this peculiar poison, developed the signs of advanced lead disease. The minor degrees of illness from minute doses of lead must have been unrecognized in a great number of cases where no physician was consulted, and where, even if he had been, he might readily have failed to trace them to the use of water conveyed very likely in the

same way as that which he had himself used without any visible harm.

The only safe practice with water which has not been tested with lead pipe by long experience, is to use some other material than lead for its conveyance.

The only reason (and it is an excellent one as far as it goes), why lead pipe is so generally used for the distribution of water, is that it is cheap and convenient. Many substitutes have been proposed. Iron naturally suggests itself first, and, on the score of health, is quite free from objection, as minute doses of iron rust are harmless. One difficulty with iron is found in adapting it to the circuitous passages which domestic convenience requires it to traverse in our houses; another is found in the obstruction of the pipes by rusting. For conducting water from a spring in a direct line to the dwelling, it may be regarded, in spite of this latter objection, as practicable, cheap and safe. It has been said that the iron rust might render it unfit for washing white clothes, but this objection seems rather fanciful than real, as in all city houses supplied with hot water it is carried through an iron water-back behind the range, besides passing through miles of iron mains, without discoloration.

For use in wells or for conducting water from springs, tubes of wood have been proved by long experience to be generally good and wholesome. It has been thought that water containing sulphate of lime sometimes acquired a flavor of sulphuretted hydrogen from its passage through decaying wood. It is certainly a perishable material, but so is lead, and the latter by dangerous corrosion. We are inclined to believe that, generally, wood will last longer than lead.

To obviate the inconvenience and obstruction caused by rusting, the (so-called) "galvanized iron" is often used. This is prepared by passing iron pipes, cleaned by dilute acid, through a bath of molten zinc.* It is claimed that the whole character of the metal is thus changed, and the zinc does actually seem to soak in, in certain cases. But the quality of

* It has been said that zinc (as well as lead) may impart a poisonous quality to water conducted through it. This is not proved, nor is it very probable. The question is discussed by Dr. Winsor, of Winchester, in the Boston Med. and Surg. Journal, Jan. 5, 1871, and the conclusion reached that although carbonate of zinc may be found in water conveyed through galvanized iron pipes it is no more harmful than carbonate of iron.

the product varies, so that often the coating of zinc is only superficial, and sometimes the interior of the pipe is not completely covered. There can be no doubt that this zinc covering preserves the iron from rusting for a certain time, varying with the quality of the pipe.*

Gutta-percha pipes are sometimes used in wells and would seem to be excellent for this purpose, but it is questionable whether they will bear the pressure of the water-works of Boston.

Pure block-tin pipes are excellent on the score of health, as the oxide of tin is insoluble, but they are rather expensive for general use.†

Quite recently much use has been made of lead pipe lined with tin. This material is sufficiently flexible to be carried anywhere, and is not expensive. It has been longer used in England than in this country, and is there highly commended and on good authority. Nevertheless, it would seem difficult, if not impossible, to entirely prevent in this way contact between lead and water, and when it does take place, the corrosive action would be rather hastened by the presence of the other metal. Time alone can prove the value of lead lined with tin, and it is yet new.‡

The same may be said of the seamless brass tubing now being introduced, to save the expense of repairs, in a good many places. For drinking water it must be looked upon with suspicion.

Glass tubes, and iron lined with glass have sometimes been used, and seem to answer every condition required by health; but, as in so many other things, health, convenience and economy cannot in this way be combined.

* See Mallet, in report of British Association for 1840.

† Block-tin pipes are rapidly corroded underground, and should be protected in some way from the action of the soil when used under such circumstances.

‡ Since the above was written we hear on good authority of some tin-lined lead pipe being removed after being in use two years at Roxbury Highlands, and found perfectly uninjured and even bright on its internal surface.

TRICHINA DISEASE IN MASSACHUSETTS.

TRICHINA DISEASE IN MASSACHUSETTS.

There have been two recognized outbreaks of this preventable disease in 1870 ; one in Saxonville, and the other in Lowell.

The discovery of this strange and terrible cause of sickness and death is an excellent illustration of the progress of science, of the use of the microscope, and of exact and careful observation. Here is a disease which we have every reason to believe has existed among men as long as they have eaten pork, which has killed or made sick thousands upon thousands of people, and yet whose nature and whose cause no man suspected until within a very few years. The first glimmer of light concerning it was perceived in 1832, but since 1860 it stands clearly revealed through the labors of physicians and microscopists all over the world, so that to day it is one of the diseases most completely understood. Its history, its causes as occurring in man, and the means of avoiding it are now plain and intelligible. Trichinous pork is the flesh of a pig containing, imbedded in its substance, very minute living worms of a peculiar kind, invisible to the naked eye, each coiled up in a snug little oval capsule. The pig having this parasite in its muscles may be, and often is at the time of killing in apparent health. He may have been well cared for, and there may be absolutely nothing in his condition or in his surroundings to excite the least suspicion. This was true of the Tewksbury pig which caused such suffering to the family at Lowell in the present year. Yet whoever eats the smallest morsel of the lean meat of the animal without first killing the parasite, becomes surely affected with one of the most painful and terrible, although fortunately not one of the most fatal of diseases.

The parasites on being swallowed by man are quickly freed from their capsular envelope, multiply with immense rapidity,

and in three or four days the intestine swarms with the young trichinæ or flesh worms. They then set out on their travels, piercing the walls of the intestine, and boring their way through all intervening tissues, they proceed to establish themselves in the muscles (the red flesh) of the whole body. No muscles, except those of involuntary motion, escape their presence.

It is as if myriads of needles were being thrust through the flesh of the unhappy subject. The great muscles of the extremities and of the trunk of the body, the little muscles concerned in turning the eye, all, big and little, are invaded by these worms. The whole body is alive with them. Their number is so great that a minute fragment of flesh placed under the microscope reveals scores of them pushing their way through the muscular fibres.

Finally, in the course of about four weeks if the patient survives the suffering and the disturbance of vital functions, the worms all find the home they have sought, the promised land of the red voluntary muscle, and there they coil themselves up, become encysted or encapsuled, as originally found in the flesh of the pig, are dormant, comparatively harmless, and in the course of years die, and are changed into a chalky material which remains ever after in the muscle, weakening its structure somewhat, but apparently doing no great subsequent harm. In this condition they are not very infrequently observed in the bodies of those who have died from other diseases.

The writer has now in his possession a piece of dried flesh taken from a dissecting-room subject many years ago, and which has the appearance of being finely dusted with a grayish powder. On microscopic examination each of these minute points is seen to be a trichinous capsule converted into a cretaceous material.

The symptoms of trichina disease ordinarily observed are as follows:—

1st.—Feverishness, loss of appetite and of strength. Sudden swelling of the face, particularly about the eyelids, but without pain; copious perspirations.

2d.—Swelling of the muscles all over the body; every movement is now attended with severe pain; the muscles are also sensitive when touched.

3d.—Contraction of the flexor muscles of the legs, arms, and trunk, so that the patient lies drawn up, and upon his side;

swelling of a dropsical character, affecting the feet, legs, thighs and trunk. This order of signs marks the disease, and occurs in no other. There is usually diarrhoea, but not always. The prostration and febrile action bear a certain resemblance to typhoid fever, with which trichina disease has no doubt been confounded in previous generations before the flesh worm was seen.

The cases occurring in Massachusetts during the past year were under the care of Dr. G. S. Eddy of Saxonville, and Dr. Joel Spalding of Lowell, and we are indebted to these gentlemen for the following details. The Lowell cases were also seen by the writer on the 9th of April.

A family in Saxonville consisting of six persons partook of a dinner of fried fresh pork on the 8th of February, 1870. It was the only fresh pork used in the family during three months, with one exception. A portion of the meat was underdone, and the member of the family who ate the red and imperfectly cooked pork suffered most. Three escaped entirely, and three were affected on or about the 15th of February with the following symptoms.

Very marked lameness, soreness and stiffness of the voluntary muscles, more especially those of the calf of the leg. This muscular pain was the first sign in all these cases, and the most distinctive sign throughout. All three, however, had swelling of the face and of the feet.

The youngest, a boy of fourteen, after an illness of four weeks, during a portion of which period he had diarrhoea, entirely recovered.

His sister, two years older, was more seriously affected. For ten weeks she was confined to her bed, most of the time unable to lift hand or foot, and the lightest touch causing excessive pain. During this time there was no diarrhoea, and no marked increase of temperature, but an extremely rapid and weak pulse. Appetite voracious. No gastric disturbance. On the 16th of May she was just able to move about the house with muscles impaired, but daily improving.

The case of the eldest, a young man of 19, assumed about the third week, the general appearance of typhoid fever. Extreme depression, abdominal tenderness, diarrhoea, bleeding from the nose, pulse 150, finally, coma and death on the 12th of March.

Portions of muscle taken after death from the arm, thigh and calf of the leg proved to be swarming with living trichinæ.

No portion of the pork could be obtained for examination, nor could any history of the pig be got from the butcher who sold it. He was somewhat incensed by the subsequent small demand for fresh pork in the neighborhood, and declined giving any information.

The trichina disease was communicated to a family in Lowell in February and March, 1870, through a smoked ham from a pig raised by a Tewksbury farmer. It was one of an apparently reputable litter, had been well kept, and exhibited no sign of disease during its life. The ham and some of the salted middlings from this pig were delivered to the family in Lowell on or about January 20th.

The family consisted of father, mother and six children.

The two youngest children ate none of it. The father ate some of it slightly cooked, and the rest of the family ate it *raw*, cut in thin slices like smoked beef.

It seems to have been used as a sort of relish, eaten with bread, and portions of it remained in existence and were examined under the microscope as late as April 1st. The infection was thus received in small portions and at considerable intervals by different members of the family, except in the case of a girl of sixteen who had been absent and returned home on the 3d of March.

The first signs observed in all these cases except one, were those of an ordinary cold. Weakness, loss of appetite, shivering, and irritation about the air-passages.

The daughter declared that her first indication of illness was swelling about the eyes. In a few days muscular pains succeeded in all the cases.

Then stiffness and contraction of the muscles, swelling of the feet and of various parts of the body. In all there was great prostration of strength, and a rapid pulse. There was diarrhoea in three of the six cases.

On the 9th of April all were able to be on their feet except a boy of 11, who laid on his side with the body bent, arms and legs strongly flexed, complaining of great pain on being touched, with a rapid pulse and an expression of great suffering. He

was quite unable to extend his body or extremities, but had a voracious appetite, and subsequently recovered entirely.

The daughter of 16 had the complexion and facial expression of Bright's disease, and walked across the room stiffly, without being able to touch her heels to the ground, like a person under the influence of strychnia. She was improving daily.

The fragments of ham which were sought for by Dr. Spalding early in his attendance on these singular cases, and which fortunately remained, were found to be filled with living trichinæ.

The salt pork from the same pig was also crowded with them in perfect form and shape, each curled up in its little cyst, but probably killed by the pickle.

The *prevention* of this pork flesh-worm disease is entirely within our power, and depends upon the following well ascertained facts. Although the vitality of the trichina is maintained for years in the muscle of either man or pig, ready to become active and to reproduce its like on being transferred to the intestine of another animal, its life is completely destroyed by thorough cooking. A temperature of 150 to 160 degrees Fahrenheit is fatal to it.

Pickling may and probably does render the pork harmless.

Smoking (except at a very high temperature) certainly does not, as we see in the Lowell cases and many similar ones in different parts of the world. In some parts of Germany, where much uncooked pork is eaten in the form of sausages and ham, there are government inspectors to examine with the microscope portions of every pig offered for sale. This of course would be quite impracticable with us, and is indeed unnecessary anywhere if people will understand the all-important fact that uncooked pork muscle, that is to say the *lean* portion, (for trichinæ are not harbored in the fat) can never be eaten with safety. It should not only be cooked, but fresh pork, whether spare-rib or sausage, should be cooked so thoroughly that all redness has disappeared from it, and smoked pork should be boiled at least two or three hours. If a temperature of 160 degrees has reached the interior portions we may eat it without fear of trichina disease.

•

HEALTH OF TOWNS.

HEALTH OF TOWNS.

REPLIES OF CORRESPONDENTS TO INQUIRIES CONCERNING THE PROBABLE CAUSE OF SUCH DISEASES AS ARE SPECIALLY PREVALENT IN MASSACHUSETTS.

In our Circular of April 8, 1870, the following questions were asked:—

1st. Is there any disease, or are there any diseases which seem to be specially prevalent in your town, or in the region in which you practise?

2d. If so, will you do us the favor to state what they are?

3d. Can you account for this special prevalence, and is it, in your opinion, removable in any degree?

These questions will be seen to cover an immense field. They were proposed in order that some general idea might be formed of the extent and value of the materials at our command, and in the belief that a comparison of the replies would furnish a guide for more direct inquiries in all parts of the State, as well as for the study of the causes of local disease in the various towns.

These expectations have been fulfilled. Although a very large majority of the answers received have been mere negations, there is a valuable remainder in which will be found facts of the greatest interest, and many speculations and suggestions founded upon daily observation, sometimes extending over a very long term of years.

Physicians, as a class, are not communicative. They neither talk nor write much. In the smaller towns they but rarely have opportunity of communicating freely with each other, and except in the occasional meetings of the District Medical Societies, or in consultation, each goes his own way. Even in the

larger towns and cities where physicians are numerous, although, as everywhere in the civilized world, the knowledge of each is the common property of the profession, there is but little talk upon the causes of disease.

But if physicians say little and print almost nothing on these obscure subjects, it is certain that they think a great deal. In the course of his long and weary rides about the country, the Doctor ponders and speculates upon the causes of what it is the business of his life to contend with.

Why does that particular farm-house have fever or dysentery among its occupants every year in a certain month?

How is it that three or four different families who have lived in a certain house within my recollection have become consumptive?

Why does a certain hill, or ledge, or swamp, or clay bottom prove fatal to three times as many of its inhabitants as another locality within a mile of it?

Do as many people die of consumption now as thirty years ago when I began practice?

How has the temperance reform affected public health?

What change has taken place in the health of the people in this town since they left off going to sea and took to shoe-making?

Such questions are suggested by daily experience, but have not often been answered in printed publications, or in any form through which other practitioners or the general public could use the knowledge thus gained for the general good of the community. Such information has for the most part been lost by the death of those who collected it.

The following extracts from letters received from physicians, chosen by the selectmen of towns in every part of the State, will show how deep is the interest which they feel in the study of the causes of disease; and we doubt not will give the medical profession still stronger claims than ever before to be regarded as the natural guardians of the public health.

The whole number of replies received to the Circular before referred to is one hundred and seventy-one. Of this number, one hundred and twenty say that no disease is specially prevalent in the town or region of their practice. Fifty-one designate

either a special disease or a class of diseases as specially prevalent, and they are thus divided :—

Respiratory organs,	20
Consumption,	15
Typhoid fever,	9
Disease of nervous system,	2
Croup and pneumonia,	1
Dysentery,	1
Functional diseases of uterus, caused by use of sewing machines,	1
Cerebro-spinal meningitis,	1
Rheumatism,	1

Acushnet.—Consumption and typhoid fever are the most prevalent diseases, and seem to be influenced by easterly and southerly winds blowing across the Cape, and by a great deal of swampy land and stagnant water.

Amesbury.—"Lung diseases prevalent. The town, or rather its most thickly settled portion, is located about seven miles from the seacoast. To the west and northwest hills rise, leaving the village in a hollow, through which flows Powow River. We have strong east and northeast winds. A large portion of the Irish live in tenement houses built along the bank of the river, and but little raised above the high-tide level. In some localities and houses I think I have been right in attributing the frequent throat and lung difficulties to dampness of the house or part of the house occupied by the family."

Attleborough.—"Consumption is of frequent occurrence, but perhaps not disproportionately to other diseases. In every case of consumption seen during fifteen years I have found that ancestors in the direct or collateral line have died from it. I have met with some marked instances of arrested phthisis where the physical signs indicated the first stage of the disease. These cases have seemed to testify to the correctness of Niemeyer's theory. The disease has, under my observation, occurred in several instances twice or three times in the same house. In one case, where three persons have died within five years, the house, though large, open and well-exposed to air and light, is on a ridge between two swamps, neither of which is more than two or three hundred feet distant. I have

also learned that before my acquaintance, one or more cases of consumption occurred in the same house. In another place where there have been three deaths from this disease within my knowledge and another previously, the house is surrounded on three sides by low lands and on the east there is a high hill. The town is well elevated, but there is much undrained land and prevalent surface water."

Ashland.—Occupation of the inhabitants, boot-making, chiefly; the usual number of mechanics of other classes and a few farmers. The main village, on a level plain at the confluence of two streams and surrounded by hills. The soil is a sandy loam, with a yellow subsoil resting on a bed of gravel. The whole plain is full of water in the spring, but the natural drainage is excellent. From the lowness of this plain a stranger would suppose that Ashland must be an unhealthy town, but our correspondent thinks it above the average in respect of health. (For further remarks concerning the diseases prevalent here at certain times and places, see under the head of typhoid fever.)

Athol.—Air of lower village affected injuriously by stagnant water.

Brimfield.—"Pigsties and privies are the chief abominations of country dwellings, and will, in my opinion, continue to be a great cause of disease until the people are educated on this point. If they were properly attended to, there would be less sickness. I have in several instances directed the removal of piggeries which had been built close up to the dwelling."

Boston.—Our reply to the question concerning diseases specially prevalent may be found in another part of the present volume, under the head of "Analysis of the Mortality of the City of Boston." This information applies to the year 1870 alone. For a series of years the answer in general terms would be that the diseases most prevalent are those of infancy, and that they are dependent chiefly upon the impurity of air and of food.

Boston is blessed with an abundant supply of pure* water for rich and poor, and for this we cannot be too thankful. Vaccination has also been, for many years past, provided gratuitously for all who would avail themselves of it, and this, combined with the rule

* The qualifying statement should be added that lead, in minute amounts, is always found in the water when lead pipe is used for its conveyance.

that all children before entering the public schools shall produce evidence of vaccination, has kept small-pox under control. An inspection of milk is made by public authority, and with the best results. Public bathing-houses during the summer months have been established, and have proved of great value. All these are important provisions for public health, but they are only exceptions to the general rule of indifference to the general subject.

Boston has grown to be a great and crowded city, needing to avail itself of all the aid which modern science can furnish to prevent the origin and spread of disease, while its (so-called) health department is almost exclusively occupied in the direction of the city stables, and of the men and horses and carts connected with those establishments, and is seemingly without a care beyond the routine of scavenging, which is conducted on the same plan as when Boston was a town. When nuisances have grown to be unbearable by those exposed to their influence, and after repeated "complaints" have been made, an effort is made to suppress them; but there is no spirit of prevention, or of anticipation, and no sign of an intelligent appreciation of the consequences of sanitary neglect.

The legislature has provided laws framed to meet all our needs but they are not executed.

The deficiencies of the public service in these respects are set forth in the following document, which was presented to the Board of Aldermen in April, 1870, by the physicians who then accepted what they regarded as the responsible office of "Consulting Physicians of the City of Boston."

CITY OF BOSTON.

To the MAYOR AND ALDERMEN, *Health Commissioners of the City of Boston.*

The undersigned have recently received the honor of appointment as Consulting Physicians of the City of Boston.

Being desirous to understand at the outset the exact nature of our duties, application was made to the City Solicitor.

From that officer we learn that we are required to watch over the public health, and give timely warning of danger from any form of preventable disease, and that, failing to do this, we should not comply with the intention of the ordinance requiring our services.

This grave responsibility we accept, and in accordance with its obligations beg leave respectfully to make the following statements.

The death-rate of Boston has been for some years past so high as to excite the attention of the medical profession.

With natural advantages for drainage and ventilation equalled by very few cities in the world, and with an abundant supply of pure water, there is still

an average annual mortality of between twenty-four and twenty-five to the thousand of population.

During the past ten years the chance of living has been not quite as good in our City of Boston, almost surrounded by the sea, with a population of 200,000, as in London, on the Thames, with a population of 3,000,000

The greater vital depression caused by want and misery in that most vast of modern cities seems to have been more than counteracted by the careful protection of public health.

Comparing the mortality of Boston with that of other parts of the State, the indications are also very unfavorable.

Half of the people of Massachusetts live in districts where the annual mortality does not exceed seventeen or eighteen to the thousand.

In 1868, the last year of which the records are published, four hundred and eighty-seven deaths from cholera infantum occurred in Suffolk county, while in an equal population outside of city limits the number was less than one hundred. The mortality from all bowel diseases of children is in similar proportion in Boston and in the country.

There are causes for this excessive mortality, and it is our duty to try to discover what they are, and if possible to point the way for their removal.

Among the first requirements for public health in a crowded city are sewerage and pavement,—such sewers as will cause all the foul liquids to flow away by force of gravity, and such pavement as will prevent all soakage into the soil.

To obtain these in perfection is a work of time, of great cost, and of the highest engineering skill; we cannot hope to have them changed except by slow degrees, and by such processes as have for many years been going on in Boston with public approval.

But there are other means of protecting public health easily reached, and whose benefits might be at once enjoyed by the citizens, to which we would invite your attention, as we deem them to be of great importance.

Our streets are not clean. It is perhaps unfortunate for sanitary progress in Boston that comparison in this respect with New York is so readily made. We return from that city congratulating ourselves on the superior cleanliness of Boston streets, which no one can question, but sometimes forgetting that the standard of comparison is a very low one.

The Metropolitan Board of Health of the city of New York have already accomplished a sanitary work from which other great cities may learn many useful lessons.

They have reformed the tenement-houses, suppressed dangerous epidemics, cleaned and disinfected the vaults, and removed or regulated all offensive trades; but the streets have been always entirely beyond their control, and the Board of Health are not in the least degree responsible for their condition. Street-cleaning in New York is a corporation job.

There can be no doubt that, in so far as the streets are concerned, New York is the most filthy great city in the civilized world. Our standard of comparison should be the streets of the great cities of Europe, which are as

much cleaner than the streets of Boston, as ours are cleaner than those of New York,

The dirt of the streets of Boston is made up, in great part, of the excrement of horses. This is allowed to accumulate, being alternately dried by the sun and air and soaked by the rains and watering carts, until it forms a foul and dangerous compost, tending directly, through the air with which it is in contact, to the production of disease. The interests of public health require that it be removed with much greater frequency than is now practised. We are of opinion that, during the summer and early autumn, every street in the city should be cleaned once in twenty-four hours, and the great thoroughfares by night.

There are, in all parts of Boston, filthy back-yards, alleys and passageways, broken-down and overflowing vaults, and, in the older portions, disused wells and cisterns, which are receptacles for dirt. All these nuisances should be reformed.

Offensive trades, like fat-melting and bone-boiling, are carried on in open vats in the midst of a crowded population. They should be compelled to use methods, tried and approved in New York, by which the sickening vapors may be entirely consumed. The authority to control these trades is given by statute.

House-offal, or swill, is allowed to become putrid before removal from the houses of the citizens. The offal is a source of profit, being kept by special ordinance free from mixture with ashes, which would tend to prevent its becoming offensive; but this enforced division of refuse material makes it the more obligatory upon the city authorities to take the dangerous portion away before it undergoes decomposition.

In our opinion public health requires that house-offal should be removed, in summer and early autumn, every day from every house.

Our tenement-houses are in a condition discreditable to a civilized community. It is only necessary to visit Friend Street Court, or the "Crystal Palace," in Lincoln Street, for any citizen to see under what desperate circumstances the occupants of these and hundreds of other similar houses are compelled to live. Their rents are enormous, and their condition calls for the relief which the legislature of 1868 intended to afford them through the Tenement-House Law.

This law has been a dead letter, but the interests of public health require that it be enforced without delay.

It is now no one's duty to inspect the fresh provisions offered for sale in Boston, while the law provides for the destruction of all which are unsound, and of all meat of any calf killed when less than four weeks old. We believe that public health requires the enforcement of these laws, and we would respectfully suggest that a systematic inspection of meats, fish, vegetables and fruits be made by city authority in a manner similar to the inspection of milk, which has proved to be so useful.

We think that all the reforms to which we have referred are practicable.

They concern every citizen, whether he may chance to live in a good home, with apparently wholesome surroundings, or in the most wretched ten-

ement-house; for no one can escape the general influence of the sanitary condition of the city in which he dwells.

These reforms would require an outlay of money, but we believe they would prove to be good investments, and that a true economy demands them.

The money value of human life to a community is real. A destructive epidemic is expensive. Moreover, a clean and unquestionably healthy city, such as Boston might be made, would have attractions for permanent residents and transient visitors which could not fail to favorably affect its commercial interests.

It might also well be an object of pride with every citizen to furnish in Boston an example of public cleanliness and public health which other American cities would imitate.

Very respectfully, your obedient servants,

HENRY BARTLETT,
GEORGE DERBY,
JAMES C. WHITE,
WILLIAM READ,
P. P. INGALLS,

Consulting Physicians of the City of Boston.

Boston, April 14, 1870.

As the season approached when cholera infantum and the bowel diseases of children were certain to commit great havoc in and around the filthy localities in which Boston abounds, the State Board of Health called the attention of the city authorities to their unwarrantable neglect of a law of the State in a letter which may be found in the general report of the Board.

These remonstrances have produced no visible effect. Instead of improvement there has rather been a progressive deterioration during the past year; a gradual lowering of the standard of municipal cleanliness, such as has been going on for many years through the growth of population, and the inertia of the health department fixed in its old traditions.

The streets are still very dirty, the alleys and passage-ways and back-yards often filthy, the vaults still broken and overflowing, the air of crowded neighborhoods made sickening by bone-boiling and fat-melting.

House-offal is still a nuisance in all parts of the city by being kept until putrid during the warm season.

Unsound provisions, both meat and vegetables, are freely sold, and, as it is nobody's business to enforce the law on this subject, it is a dead letter.

The tenement-houses of Boston, the houses in which the most impoverished and unhappy portion of our fellow-citizens are crowded

together, are a disgrace to our civilization. Through their squalor and wretchedness they foster crime as well as disease. Moral and physical health must equally suffer under their shadow.

The rent extorted from their unfortunate tenants, often through middle-men who have great rapacity and little feeling, is far larger in proportion to what they get in return than is paid by the prosperous. A single room, fifteen feet by ten, sunless and damp, unfurnished and entirely out of repair, brings \$1.25 to \$1.50 a week, or the interest of \$1,000. Two rooms, fairly above ground, but equally squalid in all other respects, bring double this sum. All such premises are at the present time crowded to overflowing at the above rates. Often twenty families may be found using the same privy, filthy and repulsive in condition. Nowhere in these houses can the slightest evidence be seen to-day of the existence of a law of the State passed in 1868 for their regulation, and whose execution is vested exclusively in the Board of Health of the city of Boston.

Lest the above statements concerning the dwellings of the very poor should be regarded as exaggerations, the following list is given of places visited by the Secretary of the State Board of Health in November and December, 1870, and which justify the description:—

NOTE.—Where numbers are not given, reference is intended to the general character of houses in the street or court.

Stone's Yard, 100 Cross Street.
105 and 107 Cross Street.
Young's Court, rear of 124 North Street.
Mechanic Court.
Blind Alley, rear 209 North Street.
Land's Court.
Rear of 324 North Street.
Stone's Alley, Stillman Street.
Cook's Court, rear 390 Commercial Street.
Holden Court, rear 398 Commercial Street.
Commercial Court.
Basements in Pond Street Place.
Institute Avenue.
Basement of No. 8 Morton Place.
Crystal Palace, Lincoln Street.
Utica Street.
Cove Place.
Shaving Street.
Rear of 147 Kneeland Street.
128 Kneeland Street.

Cove Street.

Rear 298 Federal Street, extending around to Shaving Street.

137 Beach Street.

Federal Place, rear of 235 Federal Street.

Belmont Barracks, Broad Street.

116 Broad Street.

Wharf Street.

Rear of 155 and 157 Federal Street.

Holden Place.

62 and 72 Joy Street.

Stanhope Place.

Rear of 42 and 44 Phillips Street.

Southac Place.

Wilberforce Place.

Lee Place.

Lindall Alley.

Adams Place.

Barton Street (57 and 59) and Short Napier Street.

Parts of Billerica and Nashua Streets.

28 and 30 Lancaster Street.

126 Merrimack Street.

Alley leading from 132 Merrimack Street.

Parts of South Margin Street.

Rear of 67 Pitts Street.

Rear of 71 and 75 Pitts Street.

Yard and privies of 91 Merrimack Street.

47 and 53 Portland Street.

Alden Court.

Doherty Court, East Boston.

Rear of 107 Everett Street.

Second Street, (S. Boston,) south side, from Athens Street to No. 49.

Green's Alley.

Dungarvin Block.

Boston Wharf.

Athens Street from Second to A.

Slate House, corner Third and B.

Dewarson's Block, Silver Street, corner of C.

Silver Street, between B and C.

Buckley's Block.

Old Colony Block.

Parts of Ontario Street.

Parts of Rochester Street.

In evidence of the want of prevision of nuisances, of the complete neglect of their formative stage, when they might be prevented, of the indifference which permits their establishment, or of the ignorance which fails to see in advance the results to which they must

certainly lead, we would call attention to a hotel or lodging-house of seventy rooms at 44 Portland Street, built in 1870. At least, half of the whole number of bed-rooms have no windows, and are on both sides of long passage-ways only four feet wide. The rooms are in dimensions about ten feet by eight, and are absolutely dark, so that you cannot see the opposite wall without lighting the gas, and have their only supply of air through the narrow passage-way into which the doors lead. All this, of course, is in direct violation of the Tenement-House Law of 1868.

Blackstone.—"The diseases most prevalent are those of the lungs and inflammations of the mucous membranes generally. The mortality among our foreign population is large, more particularly among children. Very much sickness can be traced to a want of proper sewerage and the neglect of cleanliness and ventilation."

Barnstable.—Pulmonary affections very common, accounted for, in part, by exposed position of the town, moist atmosphere, fogs, cold winds from the sea.

Billerica.—"Vaccination and re-vaccination have been grossly neglected in this town, and if smallpox were to break out to-day, not more than five per cent. of the inhabitants would be suitably protected by vaccination."

Barre.—Locality favored with great natural sanitary advantages. No disease more likely to prevail here in the future than smallpox, when once imported. People are very negligent about vaccination.

Brookline.—Our correspondent informs us that there are in Brookline three or four filthy localities occupied by foreigners, and where the houses are crowded with people who pay no regard to cleanliness; their slops and refuse are for the most part thrown upon the ground—their pigsties are offensive. In contrast with all this, we know that the greater portion of the people of Brookline enjoy all the comforts of life, and there is, perhaps, no town in the State where so large a number are in possession of all which may be supposed to promote health and long life—beautiful estates are to be found throughout its territory. Our correspondent finds, as between these two classes of inhabitants, quite as much sickness among the rich as among the poor—quite as large a proportion of illness among the Americans as among the Irish. He

writes as follows: "I have concluded, in considering the comparative amounts of sickness among those who have comfortable houses and those who live in crowded quarters, that the habit of living out of doors day and evening in the summer, which prevails among the latter class, acts as a preventive of disease.* The gross amount of deaths in the poorer class is not an indication of the comparative amount of sickness with that class, but only a proof that, owing to a want of good nursing and good care, a larger number of fatal cases occur than among the wealthier classes. With regard to our epidemics of scarlet fever, I have noticed that they are at times confined to the population in the poorer neighborhoods and at other times to the wealthier class, thus agreeing with the idea that the disease does not, as commonly expressed, 'come in the air,' but is conveyed by contagion. For instance, this autumn the inhabitants of Pearl Place and of Fairmount, two locations occupied by the laboring class, the one on the marsh, the other a mile away, high and well ventilated, both suffered with scarlet fever of a malignant type, and causing many deaths, while there were only one or two cases in other parts of the town." (See further remarks under the head of Typhoid.)

Berkley.—Bronchial diseases seem to be most prevalent. Their cause obscure. Soil rather low and wet, not very pervious to water. A good deal of easterly wind.

Concord.—"Cases of consumption, of rheumatism and neuralgia are of frequent occurrence. The Concord River is a very sluggish stream, having less than three feet fall in twenty miles. There are extensive wet meadows on its borders, subject to be overflowed two to four times a year, and to remain saturated with water several weeks at each overflow. Early after the settlement of the country, permission was given to build a dam over this stream at North Billerica. Near the close of the last century this dam was raised to facilitate the operations of the Middlesex Canal, and since then the meadows have been growing worse, and remain saturated a longer time. Some twenty years ago, the old mill and dam passed into the hands of a manufacturing company which has raised the dam still more, and aggravated the difficulty. There is upon the borders of these meadows, for twenty miles or more, a damp, chilly atmosphere for considerable portions of the year, which may be supposed to account for many cases of consumption and rheumatism. We

* In the absence of weather-strips, double-windows, and furnaces, do they not also get more fresh air in winter?—S.E.C'R.

once got an Act of the legislature requiring the reduction of the dam, but the manufacturing interests of the State combined and repealed the Act the next year, and thus several hundred thousand dollars worth of property has been destroyed, and probably many lives lost, and much suffering endured to save two or three men the difference in the cost of running their works by water or by steam."

(From a non-medical correspondent comes the following.) "This excellent old town has been settled two hundred and thirty-five years, and in point of education and general civilization may fairly be claimed to be the equal of any town in the State. It is a quiet, agricultural town with no such press of business as to prevent the citizens from taking the best care of themselves, and no such multitude of children that they may not be taken proper care of. Indeed, in one school district where there was formerly a large school, of late there have been too few children to form a quorum, and the school has been discontinued.

"The houses are nearly all old, and have been occupied for a half century or more. We see therefore that there has been time enough to get things into comfortable order, and I do not know why we may not fairly presume that Concord, as to its provisions for drainage and ventilation, is as well provided as most other towns. ' Now for the facts. A High School was finished for occupation about a year ago, at a cost of twelve thousand dollars and more, under the direction of a committee of some of our best citizens, and there is not yet the slightest pretence of any ventilation, except by opening the windows.

"When the matter was discussed at our recent town meeting, the only reason given for not providing ventilation for that school-house was that, of the nine other school-houses in town, none of them had any better means of ventilation, and that it was very expensive to ventilate, any way. The town however voted to begin their ventilation of school-houses at once with the new building.

"The absences from schools in Concord from illness have been, during the past winter, very great, and I have no doubt that want of ventilation was the cause of much sickness and loss of progress in the classes. So much for ventilation.

"Now as to drainage. To-day (April 21, 1870), probably one-half and more of the houses between the railway station and the Soldiers' monument, comprising the most substantial and compact part of the village for half a mile on the two principal streets, and two or three cross streets, have the bottom of their cellars covered with water to various depths, from a few inches to two feet. There is no pretence of any drainage to these cellars. The plain fills with

water in the spring, and it rises in the cellars. The old casks, and tubs, and planks, and vegetables, and dead rats and other nameless horrors, float and soak and exhale their aromas.

“The furnace fires are drowned, and the oldest inhabitants are very much surprised, as they have been for a century or two, at the wetness of the season.

“When I bought my house three years ago, I drained it with tiles 240 feet across the road, at a cost of less than \$25, and it is now perfectly dry. It had been occupied seventy-five years, with a foot or two of water in the cellar once in two or three years during the spring.”

Chicopee.—Our correspondent sends a drawing, showing the position of the town and the central village, with reference to the rivers which bound it on two sides. On the other sides are hills abounding in springs. Both the air and soil are unusually damp. He says: “From the location of the town, the dampness of the soil, the many springs running to the rivers, it might be expected that diseases of the lungs and throat would be prevalent, and especially consumption; but, after careful investigations and many inquiries, I find that these diseases are no more rife in Chicopee than on the highlands which stretch away on one side to the Berkshire hills, and on the other to those of Worcester county.” Water is conveyed to the central village from neighboring springs, and is of great purity.

Coleraine.—“I think that erysipelatous diseases and fevers of the typhoidal type prevail in this region, and in the western part of the State generally, more than they do farther east. I think I have also observed a periodical element in various diseases which I refer to malarial influences. I cannot fully account for the prevalence of zymotic diseases, but I believe that increased knowledge of the conditions of health, and greater cleanliness in the neighborhood of farm buildings, with land drainage, will help much to prevent these diseases.

“The mill-ponds near our factory villages, I think render the air foul in times of drought.”

Dennis.—Soil quite different on the two sides of the Cape at this point; on the south side, sandy; on the north side a stiff clay sub-soil. There are several diseases which present different appearances, as our correspondent believes, from this circumstance. Scarlet fever is one of them, and is more fatal on the north side. Lung

fever prevails on the north side. Tobacco is doing much to shorten life. "There is another thing which should receive your attention. It is the intermarriage of relations. In this locality the effect is truly dreadful. There are, I think, more than fifty children of cousins who are either straight-out idiots or feeble-minded."

Dudley.—"Lung diseases are most prevalent here; pneumonia, pleurisy, bronchitis. I think that cases of consumption are rather more frequent than in adjoining towns. I cannot account for it unless it is from the wet soil. The subsoil is clay. Location, high and exposed to winds."

Essex.—Diseases of the air-passages; also, in a less degree, rheumatism. "There is but little doubt in my own mind that the prevalence of these diseases is dependent on the chilly, damp east winds which continue here a considerable portion of the year." Soil, clayey and rather impervious to water.

Fitchburg.—Purity of water supply from wells becoming questionable, from the increase of population. A reliance on the surface water not regarded as safe in the future. Wells and springs becoming gradually less pure.

The opinion is expressed that consumption is not less frequent now than formerly, and that the apparent diminution is due to more careful registration.

Falmouth.—Pulmonary affections very common, and the most probable cause found in heavy fogs and cold winds.

Fall River.—Consumption, catarrh, dyspepsia and nervous diseases are prevalent. The first two are due, in a certain degree, to the localities. The town is exposed to cold, damp fogs, and has a large body of fresh water on the east, and Narragansett Bay on the south-west. Soil wet and impervious to water. Consumption is very prevalent among the foreign population, who have not the slightest knowledge of hygienic laws, who live in a crowded condition in the midst of filth of all kinds, and sleep in poorly ventilated rooms. These conditions are perhaps even more conducive to consumption than the location of the city.

Groveland.—No prevalent disease since dysentery in 1866.

Gloucester.—"The atmosphere in spring and summer is sometimes

rendered exceedingly offensive by emanations from decaying fish, either thrown into the harbor or spread upon land as manure.

"I am not aware that any disease has been engendered by this contamination of the atmosphere, or that those prevalent at such seasons have been peculiarly aggravated."

Groton.—Influenza has been very prevalent from atmospheric changes. A prominent cause of consumption is the want of ventilation in houses. As soon as cold weather comes people shut up their houses as tight as possible, and then, with stoves, heat them to such a degree that they become very sensitive to cold on going out of doors.

Hanson.—"The region in which I practise is considered healthy and not subject to any special disease. There are, however, small localities where it might be expected that health would be affected; and indeed I think it is. Here fevers are more serious; scarlet fever is attended with more ulceration of the throat; common inflammation of the throat is more apt to pass to ulceration, and ill-turns are more frequent. These localities are low and wet, being near cedar swamps and marshes, and sometimes foggy. This cause affecting health cannot be removed, but only mitigated by proper care and management."

Hinsdale.—"Scarlet fever has been very prevalent and fatal in this town during the past year, and has been confined almost exclusively to the foreign residents, operatives in the mills. Why the disease should be restricted to this class of our population I cannot explain, unless it be from their crowded tenements and less cleanly habits."

Hingham.—Consumption a very common disease but not to be regarded as specially prevalent. "I do not notice that this disease appears with greater frequency near the harbor, which is a flat at low tide, or along a slow-flowing stream which runs through a low marsh, on the borders of which a portion of the town is built for over a mile, than in what is known as South Hingham, which lies on an elevated and well-drained plain."

Holmes' Hole.—Bronchial affections very common in winter and spring. The winters are open, with rain instead of snow, and a humid atmosphere. Much exposed to winds from north-east, east, and south-east.

Hadley.—Cerebro-spinal meningitis has been frequently observed here. The cause entirely unknown. "The type of all disease is low, the nervous system showing great depression from apparently trivial influences. After ordinary colds, pleurisies, pneumonia, erysipelas, etc., there will be great depression, feebleness, sighing, tendency to nausea, etc.

"Six or seven years ago we had diphtheria very severely, and since have had more or less of it, but in a milder form. I know of no special agency in producing the tendency described." The soil not wet except during freshets. The air apparently pure. The houses *much* shaded.

Hudson.—"We have not been free from scarlet fever since the autumn of 1866. The site of the village is low, but with a dry and pervious soil. In the hot season the purity of the air is somewhat affected by decaying vegetation in surrounding ponds."

Hubbardston.—Our correspondent reports thirty persons living in this town who are over eighty years of age, including one aged ninety, two aged ninety-one, and one aged ninety-six. Population in 1865, 1,546.

Leominster.—No diseases specially prevalent during our correspondent's practice of thirty-two years. He believes that consumption is less destructive than it was a quarter of a century ago, and thinks it accounted for by improved methods of treatment, and by better sanitary regulations in families arising from greater intelligence concerning the causes of disease.

Lunenburg.—Our correspondent at Fitchburg sends us the following letter on the 31st December, 1870: "In the south-east corner of Lunenburg there is a reservoir pond covering about 1,000 acres, from which several mills are supplied in Shirley Village. Last summer and fall this pond was drawn unusually low,—never so low before. The pond is shallow, and a great amount of vegetable matter must have been exposed to the sun by this unusual drainage. Scarlet fever of a malignant type has prevailed on the borders of this pond and in Shirley Village, some three miles below, for several months past. I think, in a very sparse population, six deaths have occurred, and from those cases which I saw in consultation I think they died early from *blood-poison*, and not from anginose or local trouble. It has occurred to me that possibly a local influence, from decaying vegetation in that old drained reservoir, may have pre-

YEARS.	Consumption.	Typhoid Fever.	Dysentery.	Cholera Infantum.
1865,	44	14	17	9
1866,	37	12	13	13
1867,	41	7	—	16
1868,	48	8	—	13
1869,	46	9	4	18
Totals, . . .	216	45	34	69

TABLE II.

Showing the Deaths, as above, west of the line of Washington Street.

LOWER SECTION OF THE CITY.

YEARS.	Consumption.	Typhoid Fever.	Dysentery.	Cholera Infantum.
1865,	44	28	9	13
1866,	50	13	9	10
1867,	43	3	2	8
1868,	43	15	2	17
1869,	54	11	1	14
Totals,	234	70	23	62

Population of the north-east or highland section,—

1865, 11,731

1870, 16,710

Population of the south-west or lowland section,—

1865, 9,016

1870, 11,521

Mean population of the north-east section, . . . 14,220

Mean population of the south-west section, . . . 10,268

In 1865, the deaths from consumption were, in the north-east section 3.75 in 1,000 of population; in the south-west section 4.86 in 1,000. In the same year the deaths from typhoid were,—in the north-east section 1.19 in 1,000; in the south-west section 3.10 in 1,000.

The average annual mortality in the five years 1865–1869, inclusive, from consumption was, in the north-east or highland section 3.03 in 1,000 of mean population; in the south-west or lowland section 4.55 in 1,000.

Same years, from typhoid fever in north-east or highland section, 0.63 in 1,000; in south-west or lowland section, 1.36 in 1,000.

The percentages of dysentery are very nearly alike in the two sections, while cholera infantum shows only a slight preponderance on the side of the south-west or lowland section.

Middleton.—The town is hilly and of generally uneven surface, but there are long tracks of meadow on which grows a coarse grass. These meadows are sometimes covered with water, and are always

wet. The banks of the Ipswich River are also frequently overflowed. There are no unhealthy exhalations from these meadows, river-banks, nor from the ponds. Soil loamy and gravelly. There are now living in this town forty persons between the ages of 70 and 92. Population in 1865, 922.

Nahant.—Our correspondent reports a severe epidemic of whooping-cough during the summer of 1870, but no diseases specially prevalent in a series of years.

Nantucket.—Neuralgia, rheumatism, catarrh and lung affections the most common ailments, and influenced apparently by cold and dampness in the winter and spring. Not removable.

Northborough.—"No diseases especially prevalent. During the past twenty years dysentery and scarlet fever have twice prevailed extensively, with a large number of fatal cases. I think we have very few cases of consumption, but there are two families, one in the west and the other in the south part of the town, where nearly all the members have been affected with this disease. Both houses are in certain respects alike, both are situated very low, and fronting a large expanse of low meadow land, which causes them to be very damp during most seasons of the year. This, it seems to me is the cause of the disease. I have a case in Boylston similarly situated, and in which I find the same cause."

North Adams.—Typhoid fever very common in the autumn. Tubercular diseases always, though less prevalent than formerly. Mountains and valleys seem equally exposed to both diseases. The town lies in a valley with mountains on the east and west sides; consequently there is less sunlight than in most places. Morning fogs were formerly very common, but of late years are rare. The cause of this change is unknown.

Newton Corner.—"No disease specially prevalent. Village composed almost entirely of well-to-do or wealthy people, who live in houses quite well ventilated, with plenty of room about them *now*. The matter of drainage will soon demand attention. Surface water is carried off quickly by brooks running into Charles River.

"Where there are water-closets no cess-pools are provided and the drainage is into the ground. In some parts of this village there is complaint of wet cellars at certain seasons. I have not, in such cases, noticed any more disease than in other and drier parts of the

town. Perhaps there is not so good a state of health, that is all. No standing water in any part of the village. Subsoil gravelly, or sand and clay."

Newton Centre.—"The only disease which has a marked prevalence is dysentery, and that is almost exclusively confined to a region south-west of this village bordering on an extensive peat swamp, and drained by a sluggish creek. A fatal epidemic of diphtheria prevailed in this same region six years ago."

New Salem and North Prescott.—Consumption is prevalent. In some measure it seems to be developed by working on palmleaf, an occupation which gives employment to a large number of females in this vicinity. In trimming the leaf there is much fine dust. Those who braid are constantly wetting the hat so that the leaf will not break; their fingers are, in this way, exposed to cold. These occupations are favorable to the development of consumption on account of sedentary habits and in-door life, as well as from exposure to dust, and to cold and wet hands. Other causes are found in the character of the soil which is rather a heavy loam, very stony, rather impervious to water, and with swamps in many localities. A large proportion of cases of consumption met with have been on high ground. Drainage of the soil is much to be desired.

Orleans.—Consumption prevalent; also typhoid fever. Soil generally dry and sandy, but few swamps or marshes (except salt marshes), but a great number of ponds of pure water with no natural outlet. Township nearly destitute of timber and much exposed to winds.

Provincetown.—Rheumatism a disease specially prevalent in this town, both inflammatory and chronic; affecting children as well as adults, women as well as men.

Plymouth.—"In the south part of the town, along the basin of a small river flowing into the sea, consumption is frequent. The soil is in this basin low and wet."

Pittsfield.—Houses too much shaded. [See under head of "Typhoid."]

Randolph.—Consumption is less fatal, and probably less frequent, in the past few years than previously, and is not now regarded as

specially prevalent. "It has not been observed by a majority of the physicians practising here that this disease affects preferably any particular districts. Nevertheless, it is the experience of one gentleman that in his neighborhood, swampy tracts of land have furnished more cases than dry, exposed upland."

Reading.—Consumption very prevalent. Our correspondent says: "I cannot account for this prevalence except from dampness, and this is only partially removable. Much of the land is low, level and wet, and much of the higher land is retentive of moisture. In spring many cellars are partially filled with water for a considerable time."

Rockport.—Our correspondent furnishes the following sketch of the climatic peculiarities of Cape Ann, and the diseases of that section of the State, derived from observation extending through thirty-three years of practice.

"The surface of Cape Ann, on the north-east extremity of which I am located, is mostly elevated and dry, rising on all sides towards the centre more or less abruptly, and varying from one to two hundred feet in height. It is thickly studded with boulders which were once part and parcel of the underlying granite, and which probably, as successive portions formed the coast, have been thrown up by the waves, and, along with the gravel and the sand, the products of their attrition and disintegration, constitute the greater part of the soil. There are portions of the Cape where, for acres, these boulders lie so close to each other that a man cannot thrust his foot to the earth between them, or a sheep, with nose ever so much sharpened, crop the herbage that ventures to spring up among them.

"There is comparatively little low, wet or boggy land, and from the character of the soil, there is little mud in wet weather, and, if allowance is made for the vast amount of teaming from the granite quarries, there is little dust in dry weather.

"Near the centre of the Cape is a clear and deep pond, between two and three miles in circumference, which furnishes a bountiful supply of ice in winter, and from which issue two fine brooklets running to the ocean, one across the north-western, and the other through the eastern part, passing through the centre of the village of Rockport.

"Springs of pure water are not unfrequent, though most of the water used for drinking and for culinary purposes is obtained from

wells. From whatever source, it is probably as free from impurities as in any part of the State.

"On the whole, when the materials of which the Cape is composed are considered, so little adapted to harbor the causes of disease, the diversified yet elevated landscape, and the thorough washings of the surface and stirrings of the air which the storms compel us to submit to, it must be regarded as most favorable in a sanitary point of view, in so far as these causes operate.

"The climate of Cape Ann may be said to be a little exaggeration of the climate of the New England coast generally. The Cape itself, being an island rather than a cape, is exposed to the full influence of the sea-breezes in all directions, and the summer's heat and winter's cold are tempered by them accordingly. A difference of five degrees I have often noticed between the extremes of cold reported at Worcester and by our thermometer. On the hottest day of the present season it reached ninety-four degrees. I believe it never rises above that point here, or falls lower than seven degrees below zero.

"As the water warms less rapidly than the land, in the early part of the season, and cools more slowly in the latter part, we are subject to damp and chilly winds from the ocean in the spring and early summer months, engendering a good proportion of rheumatic and catarrhal affections; while from July to December, we are repaid by the tempering of the extremes of heat and cold which render this Cape a pleasant abode for the invilid and pleasure-seeker. One striking effect of the tempering of the sea-air is the fact that in winter it often rains here, when a few miles inland it is snowing, and, as a consequence, there is good sleighing in the neighboring towns, when the Cape is bare.

"Another peculiarity, though from a different cause, is that in summer the showers seem to be 'balky.' A large area of the centre of the Cape is elevated, denuded of trees, and therefore, in the warm season, hot and dry. The heated air arising from this surface prevents the condensation of vapor above it, and in a dry season we are often tantalized with the prospect of a shower which has already refreshed our more fortunate neighbors, Essex and Manchester, the cloud rising and splitting just over our heads and passing over Massachusetts Bay on one side and Ipswich Bay on the other, and distributing its treasures where they are not wanted. Similar effects are observed at Cape Cod. I have been told by residents of that cape that it is no uncommon thing to witness a shower arise, and swing round the circle, replenishing the ocean on both sides with fresh water before a drop falls on the parched sand.

"The only disease that has been thought to be specially prevalent here is consumption, and it has been the fashion to attribute it to the prevalence of east winds. That in the spring and early summer months this cause, by producing catarrhal affections, may occasionally hurry on, in the predisposed, the disease in question, may be admitted, but a very large proportion of the cases I have witnessed here have been hereditary, or due to a predisposition generated in families by unfavorable hygienic influences, such as confinement in closed, small rooms, sedentary habits, intermarriages, neglected or mismanaged skin diseases, (a cause more fruitful than is usually supposed,) and an innutritious diet. Seldom has this disease entered a family without a number falling victims one after another of those who are usually most in contact with the sick, until large families have sometimes, from this cause, become nearly extinct. There is no doubt in my mind of the infectious nature of this disease, and, consequently, that there would be a great diminution of the mortality could those constitutionally predisposed be separated from the sick. An important fact bearing on the question of the influence of the sea-winds, and which seems to me decisive that they are made the scape-goat for violation of hygienic and social laws, is that while our best lands lie on the most easterly and exposed parts of the Cape, and our farmers are out in all weathers, not an instance has occurred of a farmer dying in consumption during my residence here, while repeated instances have occurred where the sons of farmers have left their father's employment, and becoming students, or entering into mercantile pursuits have fallen in the prime of life victims to this disease. Nor is this exemption confined to the period of one generation. Our oldest citizens inform me that they have no recollection of a farmer dying in consumption.

"The east wind bloweth where it listeth, and we cannot regulate the dampness thereof. If it is a cause it is an irremediable one; but if it is the chief cause here, it is a little remarkable that those most exposed to it should suffer least from the disease.

"With regard to other diseases, my experience has furnished nothing to lead me to think that they differ in character from those of the New England towns generally, especially of the towns on the coast."

[Remarks on typhoid fever and cognate diseases may be found under that division of our correspondence.]

Rehoboth.—Pulmonary affections most prevalent. The acute forms of these diseases occur during the breaking up of winter.

Consumption generally hereditary. The soil where it prevails is wet, impervious to water, and low in situation. Air rendered impure by stagnant water in large swamps. People persist in living in the worst parts of their houses, and where the sun does not come, and thereby do injury to their health.

Stow.—"In the lower portion of Assabet Village there were last autumn a good many cases of typhoid fever, and they were confined to that portion of the village which is built upon a meadow which has once been cut over for its peat, and left to fill up again. The builders have two modes of preparing their foundations for building upon this old peat flat. One is to dig out the mud for three or four feet and fill up with sand or gravel, on which they build their houses. The other is to drive piles into the mud ten or twelve feet, and cover them over with stones and sand. They dig their wells in the mud-hole and use the water for drink and for culinary purposes. But this is not the whole story. They build their privies and pig-pens near their houses, and their sink drains add to the accumulated filth which is all mixed up with the water they use.

"From this swamp there is no proper drain. Right opposite this bog-hole is a pond belonging to the paper-mill, which is often drawn off during the night, exposing a surface covered with decaying vegetable matter, the odor from which is much complained of by those living near. Draining the swamp, which can be done without great cost, would contribute much to the health of the people who live upon or near it."

Southampton.—"Diseases of the respiratory organs are common in winter, and of the digestive organs in summer; and they both depend more upon the season than the locality."

South Hadley.—"Diseases of the nervous system are much more prevalent during the past six or seven years than formerly, appearing to affect all ages. The cause is entirely unknown. No unfavorable conditions of earth or air discoverable.

[See Hadley for similar observations.]

Stoughton.—Our correspondent has practised in the town for forty years. He says: "Travelling westerly from the centre of this place, two miles, on a street where there are perhaps two hundred persons, I find the oldest of them is seventy. Going the same distance in the opposite direction there are about the same

number of people, but I find three couples all over eighty, and three widowers aged from eighty-one to eighty-five. I know of no essential differences in the situation, except that the land where the older persons live is considerably higher, and I should judge more pervious to water."

Stockbridge.—"In all this immediate vicinity, except on the hills which almost encircle us, there is a vast deal of moisture arising from the close proximity of the river, with abundant low grounds and frequent overflowings, on the south side, while to the north lies a flat marshy meadow at the foot of the hills.

"From these surroundings one would look for rampant consumption, if imbued with the doctrines of Dr. Bowditch on this subject, but while that scourge was at large among us years ago, we now see comparatively little of it, though catarrhal troubles are not infrequent. While our settlement is on very level ground, it is nevertheless a sort of knoll, with a porous, sandy soil,* through which water readily permeates to the meadows about us. The meadows on the north, I have thought, might be drained, and certainly should be, if possible.

"If any one characteristic of disease has shown itself more than another within the range of my practice, it has been a tendency to functional disturbance of the liver and of the digestive system, usually classed as biliousness. Some of these troubles I have been inclined to attribute to the great heat maintained in the dwellings. I have often found some of the foregoing difficulties almost incurable until I could induce the parties to keep a thermometer in their rooms and regulate them to a more temperate heat. Our streets and houses used to be very densely shaded, so that one could scarcely see some of the dwellings from the street. By incessant cryings out this state of things has been very essentially modified, and the people seem to be waking up to the possible utility of a little sunshine."

Somerville.—"This town has been represented as favorable to the development of consumption, but after a residence here of fifteen years, I do not find it to be so. On the contrary, I find less of this disease in proportion to the population than in Truro, Mass., which is dry and sandy, and where I practised medicine twenty years.

"Of our foreign population I will only say, that if there is any

* A noteworthy fact with reference to the relations existing between "soil moisture" and consumption.—Szc'y.

bog-hole, they will get as nearly into it as possible, and they seem to thrive in the mud.

"Tobacco is doing much to undermine the constitutions of the people."

Shrewsbury.—Pulmonary diseases prevalent, and this owing to the general characteristics of the district: soil wet; tolerably pervious to water; great exposure to north and east winds.

Sutton.—Tubercular disease most prevalent. "My own opinion is that, in certain instances, it depends upon the character of the soil, and, in others, to proximity to streams and ponds, removable perhaps, partially, by extensive drainage. The situation is generally elevated and hilly, but the soil is for the most part heavy, impervious, or only partially pervious, to water; springy and wet quite late in the season; retains moisture on or near the surface a long time after rainfall.

"A small portion of the town has a soil differing very much from this; sandy, pervious, low or lying along the borders of streams or ponds. Very few wet meadows or swamps. Several ponds of clear water. Frequent fogs in the valleys and near streams."

Salem.—Consumption very prevalent, and due, in the opinion of our correspondent, to three causes, chiefly; 1st, the character of the soil; 2d, want of proper drainage; 3d, exposure to harsh winds.

"The soil in this city is, on one side, upon the surface a clay loam with a subsoil of damp, heavy clay, which is nearly impervious to water; on the other side, loam with a subsoil of sand very pervious to water. The city is bounded on three sides by tide water, and much exposed to harsh east winds. In one locality, where consumption is often met with, the ground is high and the soil gravelly; but on one side of this rising ground is a pond, the water of which during the summer becomes very stagnant, its emanations necessarily poisoning the air in the neighborhood. A portion of the city is made land, which was formerly a marsh. It seems to me that a thorough system of drainage would, in a measure, remove the unhealthy character of the soil; but the exposed position, the easterly winds, and the dampness which must necessarily arise from water on three sides, must always, I think, render this district the favorite seat of consumption."

Stoneham.—"Scarlet fever the only disease which seems to be

prevalent. For the past fifteen months it has been present. Cases of an extra severe type have occurred in well-to-do families as frequently as in those of the poor. Principal sanitary deficiency of the town is want of drainage. There are two tanneries. In the warm weather, the *open* drain connected with these establishments gives off very offensive gases. This drain is, in fact, the common sewer for a great part of the town, and many privies empty into it. It should be arched and covered over with earth."

[The Secretary can testify to the foul state of the ditch above referred to. Its condition has been the subject of fruitless litigation. It is certainly the duty of the town authorities to remove this nuisance before it occasions an outbreak of unmanageable disease.]

"In some boarding-houses in this town, six or eight persons occupy a small bedroom, and it is quite common to find four in one room, say thirteen by fourteen feet."

Taunton.—"Diseases of the respiratory organs have been unusually prevalent during the past winter and spring. The late autumn and early winter were comparatively mild, and were followed by a sudden change to cold and wet weather, which severely affected children and aged people. Many of our hale old men died in a very few days of congestion of the lungs; and many consumptives, who had been getting along tolerably, became exhausted and died.

"Tubercular affections are constantly under the care of our physicians.

"Taunton lies in a basin encircled by hills from one to three hundred feet high. This ridge is complete, except where the river causes a break. The Taunton River is tidal, emptying into Mount Hope Bay, seventeen miles below. Dense fogs roll 'up from the sea at times, and are retained in this basin, alternating with easterly winds. The land is swampy, and the drainage very imperfect. The city is built on the banks of the river, and when the tide is out the surface of the water is not more than four or five feet below the adjoining land. All the houses are built with cellars six or seven feet below the surface of the land. These cellars have from six to eighteen inches of water in them for a considerable part of the spring. The houses are heated in many instances with furnaces to a temperature of 70 to 74 degrees.

"When east winds set in, a constant flow of damp air, alternating with heated currents, pervades the buildings. Catarrhal affections are very frequent; rheumatism, chlorosis and anæmia appear among those who are compelled to remain within doors.

"It is a prevalent custom to keep the window-blinds constantly

closed, thereby excluding sunlight. The furniture and closets are damp in wet weather, and when the season of fogs sets in, constant care is required to keep clothes from mildew."

Truro.—Consumption prevalent. "I think this is owing to the east winds and fogs from the ocean, and also somewhat to the mode of living, as there is but little fresh meat used here."

Topsfield.—Consumption prevalent. Special cause found in wet soil, which may be improved in some degree by drainage. The soil of the hills, as well as that of the lowlands, is wet.

Air has been rendered putrid by the emanations from slaughter houses which have existed many years in and near the village.

Tisbury.—"Influenza has been recently very prevalent, affecting all ages. Rheumatism, both acute and chronic, is a common disease, and doubtless owing to cold and damp, and the occupation of the people. Of chronic diseases, dyspepsia is the most universal; nearly every other person you meet suffers from indigestion in some form. The causes are chiefly the mode of cooking, and irregularity in eating. The frying-pan is in universal requisition. Still I believe that the sudden changes of temperature, to which we are subject, produce their effect on the digestive organs. We have a large proportion of 'nervous people,' so called, especially in the upper or western part of the island."

West Newbury.—"The soil a clayey loam, impervious in a great degree to moisture. As the hills have been shorn of their natural growth, the intervening swamps have become suitable for cultivation, but are still wet and cold, until the surface water has run off or evaporated. There are very few cellars in town that have not water in them during the wet season, and they are almost always damp. I have heard many complain this spring of having a foot or more of water in their cellars. The consequence is that consumption in its various forms finds many victims. In the westerly part of the town is a swamp two miles long and half a mile wide which produces wood, or, if cleared, an inferior grass. By ditching it and clearing out an old and useless dam, the whole district would be rendered more healthy. The condition of the town, as regards both health and prosperity, would be improved by thorough drainage.

"Air is rendered foul in the neighborhood of *comb-shops*, from the pith of the horns of slaughtered cattle. This is taken out and

put in piles, making an almost intolerable odor, and constituting a nuisance which ought to be abated. ”

Wakefield.—Two severe epidemics of dysentery have occurred in the past six years, coming on when the surrounding bogs were dried up. Soil usually very wet. Cellars have more or less water in them nearly all the time. Houses are damp,—much mould observed in them. Both epidemics of dysentery were preceded by an epidemic of scarlet fever.

West Boylston.—Typhoid fever rather prevalent and has been for more than twenty years. Cause not obvious. A river town with interval lands ascending to beautiful hills. Most of the wood cut off. Soil pervious in some parts, impervious in others; somewhat springy. Interval lands not well drained. Drainage, much neglected.

Westborough.—“ Situation of village low as in a basin, shut off from winds, with dry soil and subsoil of quicksand. Typhoid fever and consumption much more rare than on the exposed hills around us where the ground is wet from a clay subsoil.”

West Roxbury.—Believed to be a more favorable place for consumptives to live in than many others. The deaths occurring from consumption are, in great part, of persons who have come here to live, after being attacked with the disease.

West Stockbridge.—“ Pneumonia and bronchitis are quite prevalent. I attribute this to the occupation of the people more than to anything else. The mining of iron ore is the chief business. The miners work underground in wet and damp places; they come to the surface in a state of perspiration and are thus subject to sudden changes of atmosphere. This district, like all of Berkshire County, is mountainous. The village is situated in a valley with a mill-pond in its midst, which in summer is often quite low and from which arises offensive effluvia from decaying vegetable matter; yet all the epidemics that I have witnessed here have originated and been most severe on the high ground. These epidemics have been dysentery, diphtheria and measles. ”

Winthrop.—See remarks under the head of Typhoid Fever.

Wrentham.—This region seems to be remarkably conducive to

health; elevated, well-drained, good water. Excellent natural sanitary advantages; of course, some minor artificial nuisances exist; little attention is paid to the condition of cellars; drains and privies are often in too close proximity to wells, giving rise to dysentery and typhoid.

Wellfleet.—Affections of the lungs prevalent. The general cause is found in locality. Exposure to cold, damp, east winds. Consumption is more prevalent in the valleys that run across the Cape, and on damp soil.

Weymouth.—Diseases of respiratory organs prevalent; due in great part to location of village; exposed to east and north-east winds. Soil clayey and moist.

“Bone factory does not tend to purify the air.”

Walpole.—Our correspondent refers to the cases of “charbon” or “malignant vesicle,” which have occurred in Walpole and which are separately described in another part of this volume.

Worcester.—No disease is found to specially prevail during a series of years. The proportion of consumption is large, as it is everywhere. Smallpox and varioloid have recently been very prevalent, but the epidemic has now subsided as vaccination has been general. Large numbers of persons at all ages were found to be unprotected by vaccination. The opinion is expressed by our special correspondent that greater power to enforce vaccination and, in case of need, to remove cases to a smallpox hospital should be given to local boards of health.

The subject of drainage is receiving much attention in Worcester. Through the heart of the city runs a brook which is now being enclosed by a covered stone wall, to be used as the main sewer. A complete system of sewers is in process of building; the outlet will be the Blackstone River.

Waltham.—Consumption more prevalent than in some of the neighboring agricultural towns, but not more so than in manufacturing towns generally. Waltham is situated in a basin drained through its centre by Charles River. Soil generally light and porous.

It is worthy of observation that although the people living in the immediate vicinity of the manufactory of sulphuric acid in this town are, during every damp day, constantly subjected to an at-

mosphere sufficiently charged with sulphurous acid gas to be very irritating to the air-passages of a person first coming into it, neither they nor the people engaged in the manufactory are apparently in any way permanently affected by it.

Westhampton.—Regarded as an exceedingly healthy town. Soil loose and stony. Good elevation. Very hilly. Excellent drainage. Our correspondent is informed that scarlet fever, although often present, has been for eighty years past non-malignant, and his observation in recent years confirms it.

Upton.—Lung diseases prevalent. Soil rather dry on the low lands and springy on the high lands. Not, on the whole, wet.

"A very large proportion of the women work on straw goods at their homes. From January to June, which is the busy season, they often work immoderately. I have theorized that this has been one strong predisposing cause of consumption; 1st, by overtaxing the strength; 2d, by the dust and fumes from the braid (much of which has been treated with sulphur and oxalic acid), irritating the sensitive throats, exciting cough and opening a road to disease."

CHARBON IN MASSACHUSETTS.

BY

ARTHUR H. NICHOLS, M.D., OF BOSTON.

ON THE OCCURRENCE OF CHARBON, OR MALIGNANT VESICLE, IN MASSACHUSETTS.

In comparing the maladies which affect mankind with those to which the lower animals are subject, we cannot fail to be impressed with the fact, that it is with the greatest difficulty that contagious diseases can be transmitted from the former to the latter, and even when the attempt is apparently successful, the symptoms invariably assume so mild a type as to be scarcely recognizable. Thus, the material containing the poisonous element of smallpox, scarlet fever, measles or syphilis has been repeatedly introduced into the blood of cattle, horses, sheep, dogs and rabbits, in the majority of cases without any visible result, and in no instance producing serious symptoms.

Man, on the other hand, by no means possesses the same immunity with regard to the diseases of inferior animals, for some of the most virulent and fatal affections to which we are subject, such as hydrophobia and glanders, are derived from dogs, horses and cattle, and when once thoroughly established, in a large proportion of cases, in spite of all treatment, terminate unfavorably.

In the year 1853, there first appeared in the town of Walpole, in this State, a most singular disease, which was recognized by the attending physician as *Charbon*, or *malignant vesicle*, a malady known from remote antiquity as prevailing among animals, but observed among mankind only within a comparatively recent period.*

* A pustular eruption, accompanied with some local inflammation, and caused by the inoculation of putrid animal matter, is not uncommon among men employed in discharging vessels laden with hides.

This affection, which resembles an ordinary dissection wound, is sometimes ascribed to the action of some of the chemical substances employed in curing the hides, or to the bite of an insect which is thought to have been brought with them from South America.

In these cases the poison is as a rule quickly eliminated without producing any serious results, and differs essentially in its character and effects from that of *Charbon*, with which it may possibly be confounded.

The same disease has since revisited the same locality at irregular intervals, until, at length, during a period of seventeen years, twenty-six cases have come under observation, a very able report of which was given by Dr. Silas E. Stone at the last meeting of the Massachusetts Medical Society.

The object of the present paper is to review briefly the symptoms of the disease and the different theories of contagion, and, at the same time, enumerate the prophylactic measures which have been proposed to arrest its course and avert its recurrence.

This affection has of late attracted no little attention in Europe, where, in certain countries, and particularly in portions of France and Germany, it prevails extensively as an epidemic, whereas, in the United States, it is none the less interesting from the extreme rarity of its occurrence.

Different writers give very discordant accounts of the symptoms and morbid anatomy of charbon, so that it is difficult to frame an unexceptionable description of the disease. The fluctuations of opinion which have at various times prevailed on this subject are indeed remarkable; so that, even now, many standard authorities fail to distinguish the different forms which the disease is capable of assuming.

Recent researches, however, have materially diminished the uncertainty connected with the matter, and it is now established that the poison of charbon, like that of scarlatina and syphilis, may manifest itself in a variety of ways, sometimes causing external lesions in the skin, at other times attacking the spleen, liver, lungs, or intestines, in all cases, however, accompanied by severe constitutional disturbance. The identity of the different forms has been demonstrated by the fact that the poison of each is respectively capable of producing the others.

I.—SYMPTOMS.

Charbon is the result of a specific poison introduced into the body, and characterized by different symptoms, according to the method by which the virus enters the circulation. If implanted on some uncovered part, there is noticed, after a period of latency or incubation varying from a few hours to several days, a minute red spot or papule, not unlike a flea-bite.

This point now becomes the seat of a small vesicle which

soon bursts and dries up, and is afterwards surrounded by other similar concentric vesicles, at first separate, but subsequently confluent, and all running the same course.

Meanwhile, under and around the base of the original papule appears a well-defined layer of thick, hardened tissue, involving the thickness of the skin and compared to a disk of sole-leather, which creaks when cut with a knife, presenting almost as much resistance as cartilage. The cut surfaces have the appearance of ordinary fibrous tissue, mottled with black pigment. At the same time a peculiar gangrenous inflammation, not unlike erysipelas, arises from the point originally affected, and spreads in all directions with the greatest rapidity. Later, the inflamed tissue becomes firmer and darker, and loses all vitality, so that it may be pressed or even pricked without the patient being aware of it; the neighboring lymphatic glands become enlarged, delirium sets in, and death ensues with the usual symptoms of blood-poisoning. The duration of this variety of the disease varies from one to several days.

In favorable cases, the course of the inflammation is suddenly arrested; a vivid red circle appears around the gangrenous portion; the patient feels an agreeable warmth and returning pulsation in the affected part, and the dead tissue is finally separated from the living, in the form of a brown lozenge, leaving behind a suppurating surface of various extent in different cases. [Aitken, Virchow, Smith, Stone.] In rare cases, two or more vesicles have been noticed upon different parts of the same individual.

In another variety of the disease the external manifestations may be confined to a mere erysipelatous-like inflammation, without any vesicle (malignant œdema), while, in a third class of cases, death may ensue without gangrene, vesicle, œdema, or other external symptom whatsoever, which serves in a measure to mask the nature of the malady.

It must be confessed, the anomalous forms which charbon often assumes, and more especially the absence of all external lesions, render, at times, the diagnosis of the disease difficult if not impossible.

Virchow * states that he has not unfrequently met with cases

* Virchow ueber Milzbrand. Handbuch der speciellen Pathologie und Therapie. Erlangen, 1855. II. Band, 1 Abth.

where suspicious vesicles were present on the neck and face, and where death quickly ensued, which would undoubtedly have been considered instances of charbon, had they occurred in a district where this malady was prevalent.

II—SYMPTOMS IN ANIMALS.

In animals, as in man, there is not much constitutional disturbance at the beginning of the disease. The premonitory symptoms, according to Virchow, are loss of appetite, a stiff gait especially marked in the hind legs, a dejected look, trembling of the limbs and body, and a weak pulse. These symptoms become greatly intensified upon the appearance of the vesicles, which may occur in a few hours or not for several days. The pulse then increases in frequency, the temperature is raised and the respiration hurried. With the complete formation of the vesicle, the crisis of the disease is usually reached, and the unfavorable symptoms either abate, while the vesicle shrinks and disappears with the diminution of the fever, or, in other cases, a sort of gangrene attacks the affected part and death rapidly ensues. In other forms of this affection, as in man, death may be sudden and unaccompanied by vesicles, swelling, or other local manifestation.

In the so-called *Apoplexia Carbunculosa*, for instance, the strongest animals of a herd, while feeding, or at work, are at times attacked with dyspnoea, trembling, cramps and bloody discharges from mouth and nose, and succumb, either at once or in the course of the day. In other cases, the malady seems to bear a close resemblance to hydrophobia. Here the animals snap, bite, run and finally fall into a kind of fit, which may be followed by partial paralysis, and results fatally in one or two days.

It has been considered by some that the virulence of the attack depends upon the appearance of the vesicles. Garreau, for example who inclines to this theory, reports that of 118 cattle affected with charbon, 112, in which no external manifestations were noticed, died, whereas six upon which vesicles were formed, recovered. In horses, as in man, there seldom arises more than one collection of vesicles, but in cattle, several are frequently found upon spots remote from each other.

It has been noticed that, as in the cattle-plague, the poison

varies greatly in intensity at different times, as is indicated by the marked difference in the severity of the symptoms. It is remarkable, moreover, that, as in the former disease, not the feeble, but rather the stout, well-nourished beasts are selected as the victims.

While the progress of the disease is generally arrested by a very low degree of temperature, a warm, moist atmosphere is thought to be favorable to its advance.

III.—OF THE MORBID CHANGES IN THE TISSUES AND INTERNAL ORGANS.

These are almost identical in man and in animals. The principal seat of the disease appears to be the blood, for the changes in this fluid are uniformly the same. It is found to be darker and thicker than in health, sometimes having almost the color and consistence of tar, and being filled with minute parasitic growths known as bacteria. The spleen has also been found in most cases to be the seat of serious changes, forming the chief reservoir of the poison as in intermittent or typhoid fever. This organ is enlarged, and distended with dark-colored blood, while its substance is softened and at times almost fluid; and such is the constancy with which these changes are found that in France the name "*sang du rate*" has been given to the disease. The liver, lungs, kidneys and veins are all found to be distended and gorged with blood. In the venous system, this distension is best marked in the vessels of the subcutaneous tissue, intestines and lymphatic glands, while in all these localities ecchymosed patches are found, extending, in the case of the subcutaneous tissue, deep down between the muscles.

In the thoracic and abdominal cavities of animals, has been noticed a peculiar yellow, serous-like fluid which at times becomes almost gelatiniform, and which has been proved to be intensely virulent when introduced into the bodies of other animals. In man, however, while the changes in the lymphatic glands, and especially those in the immediate vicinity of the vesicles, is more frequent than in the cases of animals, the spleen and liver are less commonly affected, while the serous effusion in the thoracic and abdominal cavities is rare.

With regard to the situation of the vesicles, it is to be observed that the parts of the body which are usually uncovered (as the

face, neck, chest, arms, head, and, in certain trades, the feet), are almost exclusively affected. The disease, it is true, sometimes appears in other situations, but always under such circumstances that the apparent exceptions only confirm this fact. Thus, it is reported that a butcher, in slaughtering a diseased animal, placed a soiled knife between his teeth, and the malady appeared in the mouth. Again, the blood of a slaughtered beast trickled down the back of a man who was carrying it, and the disease broke out in the parts with which the blood had come in contact.

IV.—THEORETICAL CONSIDERATIONS AS TO THE NATURE OF THE MORBID POISON OR CONTAGIUM IN CHARBON.

The nature and origin of specific virus or contagium in charbon, as well as in other contagious diseases, has of late attracted the attention of several eminent observers, and although this whole problem is still involved in considerable obscurity, yet many of the physical properties of the poisonous principle have been demonstrated by careful experiments, the results of which there is reason to believe, will pave the way for additional and more practical conclusions.

The following summary of the facts and observations regarding the contagious principle, and the nature of the contagious process appears in a recent report* of Dr. Burdon Sanderson on the "Intimate Pathology of Contagion." It serves to give an idea how great advance has been made in this important field, and thus has a direct bearing upon our subject.

There are different liquids, existing in the diseased body, and characteristic of the various contagious affections, which, being introduced into the healthy body, have the property of reproducing the disease. It was with some of these infecting liquids that the experiments referred to were made, and vaccine lymph, being the most familiar, is selected as an example.

Dr. Lionel S. Beale first called attention, in the year 1864, to the existence in vaccine matter, of certain minute particles, transparent and of spheroidal form. These he regarded as living or germinal matter, and advanced the theory that they might contain the contagious principle. The same bodies were also recognized independently, about the same time, by Professor

* Twelfth Annual Report of the Medical Officer of the Privy Council.

Chauveau* of Lyons, who carried the investigation still further, and demonstrated conclusively that the activity of the vaccine matter is contained exclusively in these particles. M. Chauveau starting with these elements of vaccine lymph, viz., the recently discovered particles, the larger bodies, known as leucocytes, and the serum which holds them in suspension, proved,

First,—that the leucocytes when separated from the serum by simply allowing them to subside are absolutely inactive when employed for inoculation.

Second,—all the soluble elements of the lymph were next separated (by the so-called method of diffusion), and it was shown by repeated experiments on children and animals, that the soluble constituents, like the leucocytes, produce no result.

Third,—that the minute particles above described are insoluble, and that moreover the activity of the vaccine lymph depends entirely upon their presence.

These experiments were subsequently completely verified by Dr. Sanderson, and disprove the previously accepted theory, namely, that because vaccine matter is transparent, and moreover is most active when most transparent, that therefore the contagious principle must be soluble.

The elements of the contagious liquid of sheep-pox were examined in the same manner, and with equally satisfactory results. In this malady, it appeared that the infecting liquid is much more concentrated than in the case of smallpox, as illustrated by the fact that while in the former affection the liquid can be diluted with only ten times as much water without losing its activity, in the latter, three hundred times its weight of water may be added, without impairing its infecting quality.

If in the above cases the dilution is carried to a still greater degree, the chances of a successful inoculation are proportionately diminished, or, in other words, the greater the quantity of water added, the greater the chances of failure; but whatever the degree of dilution, the effect produced (provided any effect is produced), is invariably the same. These effects of dilution afford the strongest evidence that the contagious principle is composed of separate particles, and moreover does not possess the physical properties of a vapor, for no other hypothe-

* Determination experimentale des éléments qui constituent le principe de la sérosité vaccinale virulente. Comptes Rendues, LXVIII., 1868, p. 289.

sis can be framed which tallies with the combination of phenomena here presented.

The assumption that the infecting virus is volatile, inasmuch as its effects are exercised at a considerable distance from its source, is then no longer tenable.

As to the specific gravity of the above particles, we are justified in inferring, that it must be the same as the fluid in which they are suspended, inasmuch as there is little or no disposition on their part to subside, so that however long the fluid containing the virus is allowed to stand the superficial layers remain as active as those beneath.

Another and more difficult problem is whether the particles of contagium owe their specific power to the fact that they are organized, and possess in themselves vitality, or whether their qualities are to be ascribed to their chemical composition. This question is purely a speculative one, and as yet involved in very great doubt.

Dr. Sanderson maintains that the phenomena of contagion, as manifested by the multiplication of the particles in the body is totally unlike any chemical change with which we are familiar. On the other hand if we assume the contagious principle to be a living, organic ferment, having the power of multiplication when deposited in living tissues, and that its simple transference will therefore be the exciting cause of the disease, then most of the phenomena to be accounted for may be explained in a very satisfactory manner. It is not necessary to assume that the blood-poisoning is the immediate result of the multiplication of the virus cells. On the contrary, from what is known with regard to the familiar ferment, yeast, it would seem more probable that this poisoning is the result of some chemical change in the constituents of the blood, caused by the growth of these cells within it. In yeast, for instance, we know that as the cells multiply, they absorb sugar, and secrete alcohol and carbonic acid, and it is not unreasonable to infer that, in a similar manner, the virus cells are nourished by extracting some substance from the blood and secreting in turn another substance, the presence of which has the effect of a blood poison.

There is every reason to hope that the experimental study of the various forms and metamorphoses of the organic substances

found in contagious matter, and the chemical changes which take place in them may in the end throw much additional light on the process of infection. In this connection may be mentioned the researches of Davaine and Hallier, who believe that certain organic forms known as bacteria and microzomes found in the contagious fluid, and which, when transferred to the blood of healthy from that of diseased animals, have the power of reproducing the disease, are identical with the contagious particles. M. Davaine claims to have proved, by experiments similar to those of M. Chauveau with vaccine lymph, that the poisonous element of charbon resides exclusively in these bacteria, and that when they are eliminated from the blood, the latter no longer retains its poisonous power. These organic forms (bacteria) are described by Hallier as consisting of cells either spheroidal or of the form of a short cylinder, and endowed with a peculiar progressive oscillatory movement. It has been demonstrated by Dr. Edward Schwarz* of Vienna that these cells are formed under certain conditions from still smaller organisms known as micrococci (microzymes) or microspores which have the appearance of minute round cells, filled with a transparent liquid and containing several nuclei. They differ in no respect from those spores or germs deposited in certain states of the atmosphere upon the moist surfaces of bread, vegetables and the like. It should not be overlooked, however, that these different parasitic growths have been found in the body in health, and they moreover accompany nearly every disease characterized by blood-poisoning.

Thus, bacteria are found in the blood in hydrophobia, glanders, syphilis and snake poisoning; micrococci abound in the blood in recurrent fever, and are still more numerous in scarlet fever; they are contained in the pustules of smallpox and cow-pox; also in the sputa in case of measles, and the alvine liquid of dysentery. As no specific difference exists in the appearance of these organic growths in the various diseases it is not pretended that the different contagia can be distinguished from each other. Inasmuch, however, as it has been noticed that under certain circumstances, the metamorphoses they undergo are essentially different, it is therefore claimed by Hallier that a distinction may be eventually found upon the different

* Wiener Med. Zeitung, April 3, 1870.

forms to which they gradually unfold. If this distinction can be demonstrated, it will, of course, indicate that a most intimate relation exists between the germs, and the different diseases in which they are found.

Other eminent observers, on the other hand, claim that no great importance should be attached to the presence of these organic growths in the blood, because, as has already been noticed, they are found in the body in health as well as in disease, and though multiplied greatly in certain diseases, they are really but harmless concomitants of the disease, acting as poisonous agents only by serving as rafts for transferring the morbid material. They maintain that these so-called germs, whatever may be their origin, remain passive or latent in the healthy body, but when, in certain morbid conditions, the blood and other fluids become diseased, they find therein an appropriate pabulum, by absorbing which they are nourished and multiplied just as, in the forests, certain vegetable fungi flourish only upon the trunks of dead and decaying trees and plants.

This view is thus forcibly expressed in a recent work* by Mr. Lionel S. Beale:—

“In various cases in which certain fungi do actually invade our tissues, the evidence of change in these last having occurred prior to the development of the fungi is sometimes so distinct, that, so far from the fungus attacking a healthy structure, and damaging it, the structure itself had deteriorated and changed or had undergone morbid derangement ere it was invaded.

“By decay it would appear that it had become converted into material adapted for the nutrition of the fungi, the growth of which had been effectually resisted as long as the tissues remained healthy. If this be so, the fungi cannot be regarded as the *cause* of the disease, any more than the vultures which devour the carcass of a dead man can be looked upon as the cause of his death.”

None the less weighty are the objections urged by Dr. Richardson of London in a recent address.

“The germ theory fails altogether to account for the immunity from recurrence of the communicable diseases, such as scarlet fever

* Disease Germs. L. S. Beale. London, 1870.

and smallpox, by virtue of a previous attack. Why cannot persistent organisms, which ever reproduce themselves in suitable soil, reoccupy the same soil, and live and reproduce there again? Can they not enter the body a second time? Or, entering it cannot they re-assert their activity? Can a man be charged with germs of smallpox or scarlet fever and remain unaffected by them? Again, if germs, capable of independent multiplication, are the cause of the diseases, why should there be recovery at all when once the body becomes infected? If the theory were true, then the body infected with organisms which, so long as they find a soil, are reproducible, should have no chance of recovery; for what is to prevent the continuance of the process of reproduction? But the facts are, that the majority of persons suffering from communicable diseases recover."

From the above quotations it will be seen that neither the vital nor the chemical or physical theory of the origin of communicable diseases is as yet satisfactorily demonstrated. Nor can either of these theories be accepted or rejected till additional investigations have increased our knowledge of the exact origin of microzymes. The problems to be solved are thus stated by Dr. Sanderson :—

"Do microzymes naturally exist as particles of living tissue, and thus take part not only in morbid processes, but in the performance of the normal functions, or are they originally morbid and imported into the body from without, being derived from the tissues or organs of other infected individuals, or produced by the transformation of the contents of the reproductive cells of the parasitic fungi inhabiting the higher plants?

"(a.) Is it true that the destructive parasites which inhabit the tissues of many of our common plants produce microzymes by a normal process of development?

"(b.) Are such microzymes respectively endowed with destructive morbid properties?

"(c.) Is it true that microzymes take part in any of the normal chemical functions, especially those which relate to the transformation of the albuminous compounds?

"(d.) Can they arise *de novo* in living tissues, in mere consequence of impaired activity of nutrition?"

Meanwhile it must be acknowledged that there are very

strong grounds for inferring that the virus of charbon, like that of vaccine lymph and cow-pox, consists of minute organic matter of unknown origin which, under certain conditions, instead of undergoing chemical decomposition, is capable of preserving its activity outside the body and of being transferred as solid particles from place to place; but, having been introduced into the blood, becomes developed and multiplied, and thus causes the characteristic symptoms.

This hypothesis, if accepted, is sufficient to enable us to explain how the disease may be communicated, and how, by the aid of certain chemical compounds, contagious matter may be neutralized or destroyed.

V.—METHODS AND SOURCES OF INFECTION.

While most writers have considered that in animals charbon may originate spontaneously, like intermittent fever in man, from miasmatic emanations, yet it has been established by repeated observations, that the districts in which the disease prevails as a epizootic, have not been characterized by any marked peculiarity either of climate or soil. On the contrary, it has been known to break out spontaneously in the most elevated regions as well as in marshy districts; in cultivated as well as in uncultivated tracts; in barns as well as in the open air.

M. Davaine, who has had unequalled facilities for investigating this disease in France, has undertaken to demonstrate that flies prove the chief source of the contagion, by sucking the blood of an infected animal and thence conveying the poison to others. Those insects, especially, which are armed with piercing probosces, seem qualified for transferring the poison in this way, but it is also possible that the wings and feet of ordinary flies may serve as rafts to convey the poisonous matter to the bodies of both animals and men.

But whatever may be the facts regarding the origin of the disease in animals, the great mass of testimony goes to prove that, in our race, the poison is exotic, being derived invariably from some of the lower animals, and the affection is most virulent when communicated by direct inoculation from horses and cattle, either during their life or shortly after their death. As the poison adhering to the various tissues of the animal is by no means destroyed when dried, or macerated in water, it is

not surprising that the persons most commonly affected with the disease are those whose occupation brings them in frequent contact with animals or animal remains, such, for example, as butchers, tanners, drovers, herdsmen, soap-boilers, manufacturers of glue, and workers in wool and horse-hair.

It is not essential that the poison should be deposited in a wound or on an excoriated surface, for experience has shown that a drop of blood or serum from a diseased animal, placed upon the skin, may in a short time cause the formation of a vesicle and the attendant symptoms.

Nothing can indicate more clearly the possible modes of infection than the report of the cases occurring in the practice of Dr. A. H. Smith * at Las Cruces, New Mexico:—

“Two men were engaged in skinning an animal which had died of the distemper. One of them had a pimple on the face which he had scratched with his nails till it bled. The other had received a scratch from a thorn in passing through the chaparral. The day was extremely warm, and the men frequently wiped the perspiration from their faces with their hands, covered, as they were, with the fluids from the animal. In a few hours vesicles were developed upon the abraded surfaces in both individuals.” * * * * “One case, occurring in the hand, made its appearance immediately after handling a number of dry hides.” * * * * “In another instance, the source of infection was a goat which, having the symptoms of the distemper, was killed, and the flesh eaten by the family. Although several persons ate the meat, that one alone was affected who prepared it for the table.”

Equally instructive are the cases reported by Dr. Pennock, occurring in Philadelphia. Here, one man, while engaged in skinning a cow that had died a few hours before, was bitten on the thumb by a mosquito. He scratched the bitten spot with the bloody fingers of the other hand, and four days afterward a vesicle was observed on this spot. Another man received a slight wound on his left hand while handling the same cow, and four days afterward a vesicle appeared on the spot of the incision.

Instances like these might be multiplied indefinitely, but the above are sufficient to illustrate how all objects which have

* Amer. Journal of Med. Sciences, Vol. LIII.

been in contact with the blood, hair or carcasses of diseased animals may be the means of communicating the disease to others.

They will also explain those singular cases recorded by Hildebrandt, in which dogs ate with impunity the flesh of animals which had died of charbon, but communicated the disease, by biting, to cattle and horses.

The question as to whether the flesh of animals that have died of charbon can be eaten with impunity has been discussed at length by those who have given this subject their attention. While numerous instances are on record in which the carcasses of diseased animals have been served to soldiers and others, in large quantities, without producing any bad results, exceptional cases are related by Fournier and Ammon,* where death quickly followed after eating such meat, although evidence is here wanting to show that this meat was thoroughly cooked.

Another not less interesting problem is whether charbon is transmissible from one human being to another, or whether the poison is exhausted in man, and here again the testimony of authorities is somewhat discordant. Thomassin† relates a case where a woman contracted the disease from direct contact with her husband, and similar instances are quoted by Fournier‡ and Stone,§ while Heilbach|| reports an instance where the malady was apparently communicated by a child to its mother.

It will be admitted, however, that these instances are of so very rare occurrence as to justify the conclusion that the danger of contagion from this source must be exceedingly small.

VI.—OBSERVATIONS ON THE EPIDEMIC AT WALPOLE.

If we turn now to the consideration of the disease as it has prevailed at Walpole it will appear that in August, 1853, a workman in a certain factory was taken suddenly ill, and died two days after, a well-marked characteristic vesicle having in the meanwhile appeared.

No other similar case is known to have occurred until April, 1861, when another man expired after an illness of twenty-four

* Unterricht über den Milzbrand, Ammon, p. 60.

† Thomassin. Diss. sur le charb. Malin., p. 31.

‡ Fournier. Observ. et Exper. sur le charb., Malin., p. 9.

§ Stone. Publications of the Mass. Med. Society, Vol. III., p. 84.

|| Heilbach, Diss. Inaug. de carb. malign. Berol., p. 16.

hours, having obscure symptoms of blood-poisoning, but without the appearance of any vesicle. Two months later, this was followed by another case, accompanied by a vesicle upon the neck.

These scattering cases attracted at that time but little attention, and the disease seems to have stopped here, without recurrence to any process of disinfection.

In March, 1866, another operative died, manifesting unmistakable symptoms of charbon, and from that time till July, 1869, the malady seems to have lurked about this same factory, indicating its presence at pretty regular intervals. During this period seven or eight cases have occurred each year, the average number of operatives employed being about eighty.

The following table (taken from the report of Dr. Stone) will indicate the total number of cases that have been observed up to the present time,* the particular varieties of the malady and the results :—

	Died.	Recovered.	Total.
Malignant Vesicle,	5	10	15
Internal Lesions,	8	2	10
Malignant Edema,	1	-	1
Total,	14	12	26

The annexed list shows the seat of the vesicles, which were invariably upon an exposed part:—

Neck,	6
Face,	5
Shoulder,	1
Nose,	1
Scalp,	1
Arm,	1

The malignant character of the malady will be appreciated when it is observed that of the fatal cases, five succumbed within twenty-four hours of the attack, in none of which, by the way, were any vesicles formed. If, now, we attempt to seek

* November, 1870.

the source of the contagion in these instances, we shall be at once struck by the fact that of the above twenty-six patients, twenty-four were employed in manufacturing curled hair. Of the other two, one was a carpenter who, a short time previous to his attack, had worked about the buildings connected with the factory, and the other was seized shortly after having nursed her husband who had been ill with the same malady. The fact that no other similar cases are known to have occurred in the town or in the State, and that in these the symptoms were nearly all unmistakable, lead to the conviction that the *materies morbi* was here introduced into the town through the medium of the hair employed in the factory.

This hair is sheared from the necks and tails of living wild horses, and is imported in bales, for the most part from Buenos Ayres, a small portion only being brought from Europe.

At the factory it is taken from the bales, picked apart by hand and sorted according to the quality and color, and then passed through a picking machine which separates the individual hairs and removes all foreign substances. It is next spun into ropes, boiled and finally dried in a heated compartment, by which the curl is set, and the ropes are now coiled and forwarded to the warehouse. During all these processes, the hands of the operatives are brought constantly in contact with the hair, while in the vicinity of the picking machine, the air is loaded with minute particles of dried animal matter, so that there is every facility for absorbing the poison by both contact and inhalation. There is a decided difference in the qualities of the hair imported, some specimens being quite clean, while others are often matted together with dirt and putrid animal matter.

Portions of this animal matter have been repeatedly introduced into the bodies of rabbits without producing any characteristic effects, and there are therefore no sufficient grounds for the belief that any of this unclean hair was charged with the virus of charbon, and the nature of the poison must, in the present state of our knowledge, render it impossible to distinguish hair that is thus infected from that of sound animals unless recourse is had to actual inoculations.

For a long while it was found difficult to convince many that the disease was in any way connected with the hair, and the

rarity of its occurrence, compared with the number of those exposed, was urged as an objection to this theory. To this, the obvious reply is, that the immunity of those who escape merely shows the susceptibility of the human race to contract the disease is small, and serves to illustrate one of the well-known laws of morbid poisons, viz. : " that many individuals are unsusceptible of their influence in the absence, at least, of peculiar predisposing causes." In hydrophobia, for instance, according to Hunter and Vaughan, only one out of twenty or thirty bitten by mad dogs contract the disease.

There are other and larger factories in New York, Philadelphia and Baltimore all of which obtain their supplies of hair from the very same sources.

When a cargo of hair arrives at New York, it is at once distributed among these different factories, and it has therefore been urged that it is somewhat remarkable, that, if large quantities of diseased hair were imported, all of it should have found its way to Walpole, and it is certain that the most careful inquiry has failed to discover a single instance of the disease or anything resembling it, in any other factory. Merchants employed in importing the hair in vessels to this country assert that no cases of the disease have ever occurred, to their knowledge, while, at the place of export in South America, persons have been known to be engaged for years in constantly handling the hair, without being aware of any bad effects therefrom. It must be remembered, however, that it is by no means necessary to assume that any very large amount of diseased hair has been imported, to account for the Walpole manifestations. We have already seen that the *materies morbi*, when dried may retain its activity for an indefinite period. Now throwing aside the three cases that occurred in 1851-1853, if we have reason to think that the hair of one affected animal was introduced into the factory at the beginning of the year 1866, it will be possible to account for the cases which have occurred since that time. We have only to suppose the morbid matter attached to the hair of one diseased horse to have entered the buildings at that time, and to have been scattered about the walls and floors by the process of manufacture ; that it was afterwards stirred up from time to time and conveyed by means of the

hands or through the medium of the air to some portion of the body of an operative, and thus to have inoculated the disease.

This view will appear more plausible when it is considered that during this period, no efficient means were taken to disinfect the buildings, and that since a thorough disinfecting process was adopted, but one mild case of the disease has taken place, although a period of sixteen months has now elapsed.

As has been previously mentioned charbon is very seldom met with in the United States, so that there are but few instances on record where it has prevailed to any extent.

In the autumn of 1834, an epizootic of this nature broke out among cattle in and around Philadelphia, and the poison was communicated to several persons who had been engaged in skinning the dead bodies of these animals. Four of these cases, which occurred in the practice of Dr. C. W. Pennock were reported at length in the *Amer. Jour. Med. Sciences*.*

The same distemper appeared among cattle in the vicinity of Las Cruces, New Mexico, in the summer of 1865, and here, again, was communicated to quite a number of individuals, the mode of infection being in many instances demonstrated beyond a doubt. A very clear account of these cases, by Dr. A. H. Smith, will be found in the same journal.†

Dr. A. L. Pierson of Salem, states that the malady occurred formerly in that city every few years, generally among men engaged in unloading hides from vessels, or among curriers and tanners. He gives a brief account of five of these cases in one of the numbers of the *Boston Medical and Surgical Journal* for 1852,‡ one of which is here given:—

“On the 29th of October, 1850, I visited an Irishman of previous good health and temperate habits, with a sore on the chin, looking like an abrasion with a margin of vesication. He had left off his work as a journeyman currier the day before, on account of feeling unwell. The margin of the sore was very hard, purple and hot. The tumefaction and induration of cellular membrane rapidly extended, without the least abatement, during the five following days. The whole front of the neck became turgid, the eyes nearly closed, the cheeks and parotid glands distended, and at the period of death it had reached the clavicles. No suppuration evinced itself in any part of the swelling. The pulse grew fearfully rapid, the respira-

* Vol. XIX., p. 18, 1836.

† Vol. XXXIV., p. 481, 1867.

‡ Vol. XLVII., p. 75.

tion hurried, the heat of the skin was intense, the mind wandered on the last three days, and death took place on the fifth day of my attendance."

Some of the other cases reported by this gentleman would, I am inclined to think, be more properly included under the head of malignant carbuncle, a totally different affection.

Although other establishments in this country have fortunately not been visited with this malady, similar factories in Europe have not enjoyed the same immunity. Trousseau* narrates that in two French factories for working up horse-hair imported from South America, in which from six to eight hands were, on the average, employed, there were twenty deaths from charbon in the course of ten years.

In Chelius' System of Surgery,† a brief allusion is made to two similar cases occurring among operatives in a horse-hair manufactory.

VII.—ON THE VALUE AND APPLICATION OF DISINFECTANTS OR ANTISEPTICS.

We have already learned from the experiments of Beale, Hallier, Sanderson and Davaine what (for the present at least) may be assumed as the nature and properties of the poisonous element in charbon, and we are now the better prepared to consider the more practical part of the inquiry, viz. : whether the agents known as disinfectants and antiseptics really exert a decided and powerful action upon organic matter and vital phenomena.

This question is discussed by R. Angus Smith, F. R. S. and William Crookes, F. R. S., in their very elaborate and exhaustive report‡ on the cattle plague in England, giving the results of a series of careful experiments to demonstrate the comparative value of different disinfecting and antiseptic agents, such as chlorine, ozone, sulphurous acid and the tar acids.

The term "disinfectants" is meant to apply to those substances, which neutralize or destroy animal poisons by oxidation or some similar action. One of the most active and common disinfectants is heat. Clothing, wool, hair and similar sub-

* Gaz. Medic. 1847. Feb. No. 4.

† Vol. I, p. 69.

‡ Report from Commissioners; Cattle Plague. Vol. XXII, p. 187, London, 1866.

stances placed in boiling water half an hour become thoroughly disinfected, inasmuch as the vitality of all organic cells must in this way be destroyed.

“Antiseptics” include those agents which prevent chemical change by destroying the tendency to putrefy or ferment. Such is the action of carbolic acid in preserving meat.*

These experiments were made upon skins, hides, meat, yeast, air and infected matter, and some of the most decisive are here quoted.

“I. A few drops of carbolic acid, added to a half a pint of sugar syrup and yeast in full action immediately put a stop to fermentation.

“II. Fresh brewers’ yeast was washed with a solution of one per cent. of carbolic acid and then with water. Its power of inducing fermentation in solution of sugar was entirely destroyed, although no perceptible change in the appearance of the yeast-cells could be detected under the microscope. The experiment was repeated several times, and always with the same result, although when the yeast was simply washed in water, it readily induced fermentation.”

The above experiments prove conclusively that carbolic acid has a special action on the fermentation induced by organic matter; it not only arrests it instantly when in progress, but it prevents the development of future fermentation.

From still other experiments, it is demonstrated that carbolic acid acts, not as sulphurous acid is thought to do, by retarding oxidation through its affinity for oxygen, nor, on the other hand, does it possess the power of coagulating albumen. It must, therefore, be admitted that it attacks the vitality of organic substances in some manner which as yet remains unexplained.

The following illustrates the action of this substance (carbolic acid) on organic life.

“III. Cheese mites were immersed in water where they lay for several hours. A few drops of a solution of carbolic acid, containing one per cent. killed them instantly.

“IV. An aqueous solution of carbolic acid was added to water in which a small fish was swimming; it proved fatal in a few minutes.

* Antiseptics have been called also by Dr. Angus Smith “colytics” from *καλῶ*, I arrest.

"V. A very minute quantity of a weak solution of carbolic acid was added under the microscope to water containing various infusoria, such as bacteria, vibrios, amœbæ, etc.

"The acid proved instantly fatal, arresting the movement of the animalcules at once. These animalcules are the almost invariable accompaniments of putrefactive fermentation.

"The above experiment has been tried with putrid blood, sour paste and decayed cheese, and in every instance, the destruction of vitality and the arrest of putrefaction have been simultaneous.

"VI. Caterpillars, beetles, crickets, fleas, moths and gnats were covered with a glass, the inside of which was smeared with carbolic acid. The vapor proved quickly fatal.

"It is also recorded by Dr. Lemaire that the vapor of carbolic acid will kill flies, ants and their eggs, lice, bugs, ticks, acari, and mosquitos and other insects of this size.

"VII. French experimentalists have repeatedly tested the influence on vaccine lymph of carbolic acid. They have employed lymph both pure, and mixed with a trace of carbolic acid. The vaccination with pure lymph was followed by the usual results, but in no instance was any effect produced by the lymph containing carbolic acid."

The following experiment tends to show a similarity between the action of vaccinal virus and that of the cattle plague.

The air from a close, highly infected shed, containing animals in the last stage of the disease, was drawn through glass tubes containing tufts of cotton wool, in the expectation that some of the virus cells supposed to be floating about in the air would be arrested by the wool. One piece of the infected wool was then exposed for half an hour to the vapor of carbolic acid. Two apparently healthy calves were then selected, and an incision being made beneath the skin, these pieces of wool were respectively inserted in each. The animal thus inoculated with the infected wool, which had been exposed to carbolic acid, remained perfectly well, but the other animal took the disease and died in a few days.*

"VIII. Experiments made upon farms in regions where the cattle plague was raging have afforded complete proof of carbolic disinfection. In some instances, the cattle upon properly disinfected

* As the plague was raging in the vicinity, it is possible that the calf which died did take the disease from the wool.—W. C.

farms have remained perfectly healthy, although whole herds were attacked and swept off upon farms a few hundred feet distant, which were not disinfected.

“In other instances, where the plague had appeared upon a farm, and the premises were subsequently disinfected, the disease seems to have been suddenly arrested. It appeared, moreover, that when a plague did enter a disinfected shed, it lost, in a great measure, its virulence, and was deprived of its infectious character. In one instance, forty-five disinfected animals were turned out to grass, and at the same time removed from the protecting influence of carbolic acid. Within a few days, the plague attacked and killed the whole of them.”

After many practical trials, and a full consideration of the relative merits of the principal disinfectants, Mr. Crookes has concluded that,—

“Chlorine and ozone have the power of converting animal poisons into simple and innocuous substances by their property of oxidation. That the tar acids neither accelerate nor interrupt oxidation, but they act most powerfully in arresting all kinds of fermentative and putrefactive changes, and annihilate with the greatest certainty all the lower forms of animal life.”

“That the most powerful, and at the same time most simple, process of disinfection, applicable to living beings, as well as buildings, is to employ the *tar acids*,* as constant æriform and liquid disinfectants.”

The positive and satisfactory nature of these results indicates very clearly the importance of resorting at once to energetic measures of disinfection, whenever there is reason to suppose that any infected hair exists in a factory, like that at Walpole.

These measures may be briefly summarized as follows:

I. All suspected hair should be thoroughly disinfected, either by boiling for one-half hour, or by wetting with a solution of carbolic acid in proportions of two ounces to one gallon of water.

* The tar acids are known as carbolic and cresylic acids. Of these, carbolic acid, the most familiar, is a white crystalline solid, prepared from coal or wood tar, which becomes liquid when a small quantity, (5 per cent.) of water is added.

Pitch and other substances of which these acids form the active principle, have been employed from the most remote times as antiseptics, having been used by Egyptians in embalming mummies.

The former process is the one which has thus far been adopted by the proprietors of the Walpole factory, from the belief that it would be more efficacious. It has been found, however, that boiling the hair extracts a large proportion of the animal oil contained in it, thereby destroying its elasticity, rendering it more difficult to pick and spin, and causing considerable diminution in the weight. •

It remains, therefore, to be decided whether on the whole, the application of the acid is not less expensive, and equally efficacious, since the weight of hair is not diminished by its use, nor its quality impaired. Furthermore, as the hair is invariably boiled in the latter stages of its manufacture, all odor left by the acid must thereby be removed.

II. The rooms to which the hair has been admitted should be thoroughly disinfected. The roofs and walls should be washed with lime. The floor and woodwork should be washed with water containing soda, and then sprinkled with a solution of carbolic acid. The clothing, boots and shoes of the operatives also demand attention, as the seeds of the disease may have attached themselves to some of these articles.

III. Those who are obliged to handle hair suspected of being infected should previously anoint their hands with a mixture of carbolic acid and lard, in the proportion of one drachm to the ounce.*

In the above observations no allusion has been made to the value of different remedies or modes of treatment, from the conviction that much more important results are to be obtained by the attempt to arrive at correct views of the nature and causes of the malady, and by anticipating its effects rather than by seeking to cure or mitigate them. It is gratifying to be able to report that the prophylactic measures carried out at Walpole have thus far been attended with satisfactory results. These results are confirmatory of the views of those who have paid most attention to sanitary questions, and afford proof that the labors of these men have been of very great advantage to mankind.

* A supply of this ointment is kept in constant readiness in the different apartments at the Walpole factory.

THE CAUSES
OF
TYPHOID FEVER IN MASSACHUSETTS.

AN INQUIRY INTO THE CAUSES OF TYPHOID FEVER, AS IT OCCURS IN MASSACHUSETTS.

It may be stated in round numbers that one person out of every thousand in Massachusetts, between the ages of five and seventy, dies yearly from typhoid fever. Excluding the extremes of youth and age within these limits, the proportion would be much larger. Reckoning the mortality at one in ten of those attacked, it seems very certain that more than one per cent. of the able-bodied adult population is rendered helpless every year from this disease, and for a period often extending through many months. Add to this the loss of time on the part of nurses and attendants, and it will be seen that the bread-winning efficiency of the people is impaired in a way which might be expressed in dollars, and it would certainly amount to a very large sum,—how large we do not pretend to estimate. Neither can we place in definite form the misery which the killing and wounding, from this cause, of so many persons in the prime of life, brings upon their kindred. The object of the present inquiry is to find out, if we can, whether all this loss and wretchedness is inevitable. If it shall appear that it is, either in whole or in part, avoidable, the information will be of value. The question is a difficult one and may not be completely answered at once, but by the collection of such evidence as now exists among us, we shall be brought nearer to its final solution.

We first seek to know where typhoid fever prevails ; to learn something of its distribution ; to compare different localities in a general way, and to find out in what towns or what class of towns it is most frequently present. Here we need a careful registration of sickness, but this is not to be had as yet, either in Massachusetts or in any other country. The time is coming when in some form or other it will be demanded and obtained.

The best we can now do is to estimate the prevalence of this disease, as of all others, by the official report of deaths. An epidemic of typhoid may have a fatality in certain years and under certain circumstances of season or place, which may vary from one in three to one in twenty; but taking a series of years this element of error diminishes in force.

The disease may be called by a wrong name in the returns from the towns. This is certainly possible in some cases, but typhoid fever has very marked characters, and before death occurs, its nature can hardly fail to be recognized. No disease, except perhaps consumption, or the eruptive fevers, is less liable to be mistaken for others.

We do not wish to overstate the value of registration returns of the causes of death. They are certainly liable to error, but after much examination we believe them to be made with great care by trustworthy and intelligent men. The system of registration has now been in use in Massachusetts for thirty years, and has been constantly improving.

The information with regard to deaths from typhoid fever received through registration, is to be taken as the opinions of the town-clerks, based usually on the certificates of medical attendants, and, in their default, upon the declaration of surviving friends, and in rare cases upon common report.

The deaths from typhoid have always been classed with deaths from infantile fever, which latter term is vague and unsatisfactory. To eliminate this source of error, the death records of every town at the office of the State secretary have been searched for the ten years 1859–1868 inclusive, and the result is given in a table, showing the total and comparative mortality from typhoid fever, during this period, in persons over five years of age, in all parts of Massachusetts.

Another kind of evidence available in this inquiry, is that presented in the *opinions* of our correspondents all over the State, concerning the relation of cause and effect in typhoid fever as they have watched it. These opinions are full of interest and value. Discordant they surely are, and must necessarily be on a question of such obscure nature. Each judges from his own point of view, influenced by the varying circumstances of locality, opportunity, faith in the possibility of discovering causes, the character of his own mind.

And let no one imagine that, because physicians disagree, it is to their discredit as observers. How often do the twelve men of a jury entirely agree, even when direct visible proof is presented to them? How many engineers, or underwriters, or carpenters would entirely agree as to the causes of injury in a bridge, or a vessel, or a house, seeing only the destructive effects?

Yet the physician, in looking for the causes of disease in that most complex of all machines, the human body, is as yet but groping in the dimmest twilight. A century or two ago it might even have been thought irreverent to pry into these secrets of nature, and even yet there lingers in some minds a doubt as to the propriety of asking why we are sick.

The remote and essential causes of the phenomena which the physician witnesses in typhoid fever, are as yet almost completely hid from his eyes. He can only associate conditions of the most various sort with their apparent effects, and by a long series of such observations, be prepared to state his convictions concerning them.

It may be said of the questions addressed to our correspondents that they indicate preconceived opinions, that they are leading questions. To a certain extent this is true, and it could hardly be avoided. To bring out definite replies it was necessary to ask definite questions, but the evidence which we have received has been arranged to support no theory, but to establish truth. Whoever could present facts carefully observed, or professional opinions based upon general experience, has been welcomed in this inquiry, and his testimony is presented in the following pages.

The circular of May 1st, 1870, had two special objects:—1st. To obtain all information possible concerning the agency of filth in causing typhoid fever, either through the medium of air or of drinking-water; and 2d, to discover, if possible, whether the same relation exists between the height of subsoil water and epidemics of typhoid in Massachusetts as has been recently found at Munich in Bavaria.

Dr. Max Pettenkofer of Munich, a chemist and philosopher of world-wide repute, has made known of late, chiefly through the pages of the "*Zeitschrift für Biologie*," some views of the nature of cholera and typhoid fever, which are of singular interest.

His observations upon the first disease do not now concern us, but they led directly to the extension of the same ideas to the enteric fever of Munich, which may be regarded as identical with our typhoid. The subject has been still further elaborated, and at great length, by Dr. Bühl of Munich, and other followers of Pettenkofer. They contend, and, in so far as Munich is concerned, they demonstrate that epidemics of enteric fever stand in a fixed relation to certain obscure and as yet inexplicable changes in the soil, which changes are signalized by the fluctuations in the height of ground-water. The years of greatest mortality from enteric fever have been the years of lowest water-level; the years of least mortality, of highest water-level; and the variations between these extremes of mortality have coincided with the comparative depth at which water is found in the soil.

These observations have been made during the past fifteen years; and within that period the degree of danger from typhoid fever has been correctly indicated by the depth of water in the wells. Upon these and similar observations elsewhere in Germany, Dr. Pettenkofer and his followers have founded an hypothesis that the causes of typhoid are to be found in *the soil*, not in the water of the soil, which is regarded simply as an index, like the face of a clock, recording changes going on behind it; and that the fever-seed or germ is the result of "organic processes" taking place in the earth, and communicated to man through the medium of air. What these changes are, or in what the fever-germs consist, are unexplained.

These views have met with great opposition, and particularly in England, where belief in the contamination of drinking-water by animal excrement is very generally accepted as the chief cause of typhoid. The facts reported by Pettenkofer have been interpreted in England to mean that in a season of drought foul matters are retained in the loose soil, and that the area of drainage for each well is greatly increased by the subsidence of the ground-water level. In certain English towns the water level was permanently reduced by artificial drainage, while pure water was brought in from springs and streams for the use of the inhabitants, with a marked reduction in the mortality from typhoid.

Another and similar cause for fever is found by English writers in the washing of soluble filth from the loose soil into the wells by the first rain-fall after a drought.

Pettenkofer and his school do not deny the general importance of having drinking-water free from taint, but think that the artificial drainage of the English towns signifies no more in contradiction of the Munich experience as regards typhoid fever than the movement of the face of a clock by human hands would influence the rotation of the earth. Setting the soil-clock at typhoid will not cause the disease. Not until the soil is "typhoid-ripe" will that form of fever appear. Filth will foster and increase its virulence, but will not originate it. Pettenkofer believes that air coming from the soil (and not water) is the common vehicle of the typhoid poison, and he urges upon all who seek to know the causes of this disease to study the soil and the changes of character which it undergoes, not merely on the surface but at all depths above that at which water fills its pores.

Table of Deaths of Persons above five Years of age from Typhoid Fever in Massachusetts during Ten Years, 1859 to 1868, inclusive.

COUNTIES AND TOWNS.	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.	COUNTIES AND TOWNS.	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.
<i>Barnstable County.</i>				<i>Berkshire—Con.</i>			
Barnstable, . . .	4,928	34	1,449	Lenox, . . .	1,660	22	754
Brewster, . . .	1,456	8	1,857	Monterey, . . .	737	15	491
Chatham, . . .	2,624	16	1,640	Mt. Washington, . . .	237	1	2,370
Dennis, . . .	3,592	43	835	New Ashford, . . .	178	1	1,780
Eastham, . . .	757	8	946	N. Marlborough, . . .	1,649	31	532
Falmouth, . . .	2,283	31	736	Otis, . . .	956	23	416
Harwich, . . .	3,540	57	621	Peru, . . .	494	6	823
Orleans, . . .	1,585	17	932	Pittsfield, . . .	9,676	93	1,040
Provincetown, . . .	3,472	18	1,929	Richmond, . . .	944	20	472
Sandwich, . . .	4,158	31	1,341	Sandisfield, . . .	1,411	26	542
Truro, . . .	1,447	9	1,608	Savoy, . . .	866	22	394
Wellfleet, . . .	2,296	15	1,530	Sheffield, . . .	2,459	69	356
Yarmouth, . . .	2,472	26	951	Stockbridge, . . .	1,967	28	702
<i>Berkshire County.</i>				Tyringham, . . .	650	9	722
Adams, . . .	8,298	111	7,475	Washington, . . .	859	9	954
Alford, . . .	461	3	1,537	W. Stockbridge, . . .	1,620	23	704
Becket, . . .	1,393	16	870	Williamstown, . . .	2,555	23	1,110
Cheshire, . . .	1,650	11	1,500	Windsor, . . .	753	5	1,506
Clarksburg, . . .	530	4	1,325	<i>Bristol County.</i>			
Dalton, . . .	1,137	22	517	Acushnet, . . .	1,251	14	893
Egremont, . . .	928	6	1,547	Attleborough, . . .	6,200	57	1,087
Florida, . . .	1,173	14	837	Berkley, . . .	847	9	941
Great Barrington, . . .	3,920	36	1,089	Dartmouth, . . .	3,435	29	1,184
Hancock, . . .	937	7	1,339	Dighton, . . .	1,813	11	1,648
Hinsdale, . . .	1,517	16	948	Easton, . . .	3,076	30	1,025
Lanesborough, . . .	1,294	4	3,235	Fairhaven, . . .	2,547	24	1,061
Lee, . . .	4,035	65	621	Fall River, . . .	17,451	136	1,286

Table of Deaths of Persons—Continued.

COUNTIES AND TOWNS.	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.	COUNTIES AND TOWNS.	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.
<i>Bristol—Con.</i>				<i>Franklin—Con.</i>			
Freetown, . . .	1,485	9	1,650	Coleraine, . . .	1,726	23	750
Mansfield, . . .	2,130	15	1,420	Conway, . . .	1,538	21	732
New Bedford, . . .	20,853	162	1,287	Deerfield, . . .	3,038	40	759
Norton, . . .	1,709	23	743	Erving, . . .	576	8	720
Raynham, . . .	1,868	18	1,038	Gill, . . .	635	5	1,270
Rehoboth, . . .	1,843	18	1,024	Greenfield, . . .	3,211	56	573
Seekonk, . . .	928	3	3,093	Hawley, . . .	687	6	1,145
Somerset, . . .	1,789	13	1,376	Heath, . . .	642	4	1,605
Swansey, . . .	1,336	14	953	Leverett, . . .	914	19	481
Taunton, . . .	16,005	98	1,633	Leyden, . . .	592	5	1,184
Westport, . . .	2,799	83	848	Monroe, . . .	191	2	955
<i>Dukes County.</i>				Montague, . . .	1,574	21	750
Chilmark, . . .	548	3	1,827	New Salem, . . .	1,116	18	620
Edgartown, . . .	1,846	11	1,678	Northfield, . . .	1,660	26	639
Gosnold, . . .	108	—	—	Orange, . . .	1,909	24	795
Tisbury, . . .	1,696	34	499	Rowe, . . .	563	6	938
<i>Essex County.</i>				Shelburne, . . .	1,654	20	827
Amesbury, . . .	4,181	28	1,493	Shutesbury, . . .	788	8	985
Andover, . . .	5,314	56	949	Sunderland, . . .	861	8	1,076
Beverly, . . .	5,942	68	874	Warwick, . . .	901	15	601
Boxford, . . .	868	12	723	Wendell, . . .	603	10	603
Bradford, . . .	1,566	15	1,044	Whateley, . . .	1,012	18	562
Danvers, . . .	5,144	46	1,118	<i>Hampden County.</i>			
Essex, . . .	1,630	22	735	Agawam, . . .	1,664	18	925
Georgetown, . . .	1,926	30	642	Blandford, . . .	1,087	25	435
Gloucester, . . .	11,937	94	1,270	Brimfield, . . .	1,316	13	1,012
Groveland, . . .	1,619	22	736	Chester, . . .	1,266	11	1,151
Hamilton, . . .	799	6	1,332	Chicopee, . . .	7,577	59	1,284
Haverhill, . . .	10,740	49	2,192	Granville, . . .	1,367	30	456
Ipswich, . . .	3,311	23	1,440	Holland, . . .	368	6	613
Lawrence, . . .	21,698	181	1,199	Holyoke, . . .	5,648	38	1,486
Lynn, . . .	20,747	188	1,104	Longmeadow, . . .	1,480	12	1,233
Lynnfield, . . .	725	5	1,450	Ludlow, . . .	1,232	23	536
Manchester, . . .	1,643	26	632	Montgomery, . . .	853	9	948
Marblehead, . . .	7,308	52	1,405	Palmer, . . .	3,080	32	962
Methuen, . . .	2,576	15	1,717	Russell, . . .	618	12	516
Middleton, . . .	922	10	922	Southwick, . . .	1,155	19	607
Nahant, . . .	313	2	1,565	Springfield, . . .	22,035	213	1,034
Newbury, . . .	1,362	23	592	Tolland, . . .	511	7	730
Newburyport, . . .	12,976	64	2,027	Wales, . . .	696	11	632
North Andover, . . .	2,622	33	795	Westfield, . . .	5,634	89	633
Peabody, . . .	6,051	27	2,241	West Springfield, . . .	2,100	22	954
Rockport, . . .	3,367	26	1,295	Wilbraham, . . .	2,111	42	503
Rowley, . . .	1,191	15	794	<i>Hampshire County.</i>			
Salem, . . .	21,189	126	1,682	Amherst, . . .	3,415	33	1,035
Salisbury, . . .	3,609	29	1,244	Belchertown, . . .	2,636	31	850
Saugus, . . .	2,006	11	1,824	Chesterfield, . . .	801	8	1,001
Swampscott, . . .	1,535	7	2,193	Cummington, . . .	980	12	817
Topsfield, . . .	1,212	16	757	Easthampton, . . .	2,869	37	775
Wenham, . . .	918	8	1,147	Enfield, . . .	997	19	525
West Newbury, . . .	2,087	22	949	Goshen, . . .	411	2	2,055
<i>Franklin County.</i>				Granby, . . .	908	13	698
Ashfield, . . .	1,221	12	1,017	Greenwich, . . .	648	9	720
Bernardston, . . .	902	15	601	Hadley, . . .	2,246	21	1,070
Buckland, . . .	1,922	26	739	Hatfield, . . .	1,405	15	937
Charlemont, . . .	994	9	1,104	Huntington, . . .	1,163	16	726
				Middlefield, . . .	727	6	1,216

Table of Deaths of Persons—Continued.

COUNTIES AND TOWNS.	Population in 1885.	Deaths in 10 Years.	Average No. of persons living each year to one Death.	COUNTIES AND TOWNS.	Population in 1885.	Deaths in 10 Years.	Average No. of persons living each year to one Death.
<i>Hampshire—Con.</i>				<i>Middlesex—Con.</i>			
Northampton, . . .	7,925	87	911	Wayland, . . .	1,137	7	1,694
Pelham, . . .	737	8	931	Westford, . . .	1,568	26	603
Plainfield, . . .	579	12	482	Weston, . . .	1,231	8	1,539
Prescott, . . .	596	3	1,987	Wilmington, . . .	850	10	850
South Hadley, . . .	2,099	21	1,000	Winchester, . . .	1,968	4	4,920
Southampton, . . .	1,216	27	450	Woburn, . . .	6,999	58	1,207
Ware, . . .	3,874	46	733				
Westhampton, . . .	636	5	1,272	Nantucket, . . .	4,748	33	1,439
Williamsburg, . . .	1,976	27	732				
Worthington, . . .	925	15	617	<i>Norfolk County.</i>			
<i>Middlesex County.</i>				Bellingham, . . .	1,240	7	1,771
Acton, . . .	1,660	14	1,186	Braintree, . . .	3,725	23	1,620
Arlington, . . .	2,760	13	2,123	Brookline, . . .	5,262	18	2,923
Ashby, . . .	1,080	20	540	Canton, . . .	3,318	13	2,552
Ashland, . . .	1,702	23	740	Cohasset, . . .	2,048	23	890
Bedford, . . .	820	13	631	Dedham, . . .	7,195	52	1,384
Belmont, . . .	1,279	2	6,395	Dorchester, . . .	10,717	53	2,022
Billerica, . . .	1,808	11	1,644	Dover, . . .	616	2	3,080
Boxborough, . . .	454	1	4,540	Foxborough, . . .	2,778	38	731
Brighton, . . .	3,854	19	2,028	Franklin, . . .	2,510	22	1,141
Burlington, . . .	594	5	1,188	Hyde Park, † . . .	—	2	—
Cambridge, . . .	29,112	134	2,173	Medfield, . . .	1,012	8	1,265
Carlisle, . . .	642	5	1,284	Medway, . . .	3,219	30	1,073
Charlestown, . . .	26,399	154	1,714	Milton, . . .	2,770	27	1,026
Chelmsford, . . .	2,291	19	1,206	Needham, . . .	2,793	22	1,269
Concord, . . .	2,232	12	1,860	Quincy, . . .	6,718	41	1,639
Dracut, . . .	1,905	18	1,058	Randolph, . . .	5,734	37	1,550
Dunstable, . . .	533	2	2,665	Roxbury, † . . .	28,426	167	1,702
Frammingham, . . .	4,665	36	1,296	Sharon, . . .	1,393	12	1,161
Groton, . . .	3,176	23	1,184	Stoughton, . . .	4,855	45	1,079
Holliston, . . .	3,125	26	1,202	Walpole, . . .	2,018	10	2,018
Hopkinton, . . .	4,132	26	1,589	West Roxbury, . . .	6,912	20	3,456
Hudson,* . . .	—	12	—	Weymouth, . . .	7,975	41	1,945
Lexington, . . .	2,220	13	1,708	Wrentham, . . .	3,072	22	1,396
Lincoln, . . .	711	8	2,370				
Littleton, . . .	967	9	1,074	<i>Plymouth County.</i>			
Lowell, . . .	30,990	191	1,623	Abington, . . .	8,576	53	1,618
Malden, . . .	6,840	55	1,244	Carver, . . .	1,059	18	583
Marlborough, . . .	7,164	45	1,592	Duxbury, . . .	2,384	20	1,192
Medford, . . .	4,839	24	2,016	E. Bridgewater, . . .	2,976	34	875
Melrose, . . .	2,865	12	2,388	Halifax, . . .	722	15	481
Natick, . . .	5,208	46	1,132	Hanover, . . .	1,545	15	1,030
Newton, . . .	8,975	59	1,521	Hanson, . . .	1,196	20	593
North Reading, . . .	987	13	759	Hingham, . . .	4,176	15	2,784
Pepperell, . . .	1,709	23	743	Hull, . . .	260	—	—
Reading, . . .	2,436	18	1,355	Kingston, . . .	1,626	13	1,261
Sherborn, . . .	1,049	10	1,049	Lakeville, . . .	1,110	15	740
Shirley, . . .	1,217	12	1,014	Marion, . . .	960	19	506
Somerville, . . .	9,353	40	2,338	Marshfield, . . .	1,809	11	1,644
Stoneham, . . .	3,298	29	1,137	Mattapoisett, . . .	1,451	19	764
Stow, . . .	1,537	18	854	Middleborough, . . .	4,565	49	932
Sudbury, . . .	1,703	17	1,002	N. Bridgewater, . . .	6,332	46	1,377
Townsend, . . .	2,042	30	681	Pembroke, . . .	1,489	26	572
Tyngsborough, . . .	578	5	1,156	Plymouth, . . .	6,068	41	1,480
Wakefield, . . .	3,244	19	1,707	Plympton, . . .	924	18	513
Waltham, . . .	6,896	56	1,231	Rochester, . . .	1,156	13	889
Watertown, . . .	3,779	19	1,988	Scituate, . . .	2,269	15	1,512

* Three years only.

† One year only.

‡ Nine years only.

Table of Deaths of Persons—Concluded.

COUNTIES AND TOWNS.	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.	COUNTIES AND TOWNS.	Population in 1865.	Deaths in 10 Years.	Average No. of persons living each year to one Death.
<i>Plymouth—Con.</i>				<i>Worcester—Con.</i>			
South Scituate, .	1,635	17	962	Leominster, .	3,313	21	1,577
Wareham, .	2,798	24	1,166	Lunenburg, .	1,167	12	972
W. Bridgewater, .	1,825	12	1,521	Mendon, .	1,207	8	1,508
<i>Suffolk County.</i>				Milford, .	9,108	64	1,423
Boston, (9 years,) .	192,318	949	2,026	Millbury, .	3,780	29	1,304
Boston and Roxbury, (1868,) .	220,744	122	1,809	New Braintree, .	752	9	835
Chelsea, .	14,403	86	1,675	Northborough, .	1,623	10	1,628
North Chelsea, .	858	1	8,580	Northbridge, .	2,642	16	1,651
Winthrop, .	633	3	2,110	N. Brookfield, .	2,514	27	931
<i>Worcester County.</i>				Oakham, .	925	14	661
Ashburnham, .	2,153	29	742	Oxford, .	2,713	22	1,233
Athol, .	2,814	30	938	Paxton, .	626	13	482
Auburn, .	959	16	599	Petersham, .	1,428	20	714
Barre, .	2,856	37	772	Phillipston, .	725	16	453
Berlin, .	1,061	20	530	Princeton, .	1,239	15	826
Blackstone, .	4,857	32	1,518	Royalston, .	1,441	37	390
Bolton, .	1,502	31	485	Rutland, .	1,011	9	1,123
Boylston, .	792	5	1,584	Shrewsbury, .	1,570	20	785
Brookfield, .	2,161	21	1,000	Southborough, .	1,750	13	1,345
Charlton, .	1,925	18	1,069	Southbridge, .	4,131	47	879
Clinton, .	4,021	27	1,489	Spencer, .	3,024	30	1,008
Dana, .	789	7	1,127	Sterling, .	1,668	16	1,042
Douglas, .	2,155	17	1,267	Sturbridge, .	1,993	16	1,246
Dudley, .	2,076	41	506	Sutton, .	2,363	30	787
Fitchburg, .	8,118	86	944	Templeton, .	2,390	36	664
Gardner, .	2,553	20	1,276	Upton, .	2,018	17	1,175
Grafton, .	3,961	58	683	Uxbridge, .	2,838	11	2,580
Hardwick, .	1,967	9	2,185	Warren, .	2,180	26	838
Harvard, .	1,355	7	1,936	Webster, .	3,608	62	582
Holden, .	1,846	11	1,678	Westborough, .	3,141	29	1,083
Hubbardston, .	1,546	31	499	West Boylston, .	2,294	30	765
Lancaster, .	1,752	21	834	West Brookfield, .	1,549	31	500
Leicester, .	2,527	15	1,685	Westminster, .	1,639	26	630
				Winchendon, .	2,801	26	1,077
				Worcester, .	30,055	254	1,183

The first thing which strikes us on looking over this table is the apparently greater mortality from typhoid in the small towns. How great this difference is will appear from the following comparison :—

Table showing relative mortality for Ten Years from Typhoid Fever in persons above five years of age, in the larger and smaller Cities and Towns.

	Population 1885 (All Ages.)	Total Deaths from Typhoid in Ten Years.	Average No. of persons living each year to one Death.	Average No. of Deaths each year to 1,000 Per- sons living.
One hundred and forty-seven (147) cities and towns of more than 2,000 inhabitants,*	1,044,294	7,888	1,323.90	0.755
One hundred and eighty-four (184) towns of less than 2,000 inhab- itants,†	213,468	2,539	840.75	1.189

There can be no doubt that typhoid in Massachusetts, is a disease of scattered communities rather than of crowded towns, of rural rather than of urban districts. In spite of the smaller mortality from all causes, typhoid is more destructive in the farming towns than in the manufacturing towns and the large cities. This is an important fact in the study of the causes of the disease, and one which we shall have occasion again to refer.

Our circular of May 1st relating to typhoid fever asked four questions. Replies have been received from one hundred and sixty-three (163) towns. The replies are tabulated under each question.

1. Have you observed a difference in the prevalence of this disease between houses supplied with water from wells about the premises, and houses supplied with water conveyed from springs or from ponds of unquestionable purity?

Replies.

Yes,	23
No difference has been remarked,	71
Whole supply of town from wells,	18
Indefinite,	51

2. Can you inform us whether, at times when typhoid prevailed, the water of the wells was rising or falling, and whether it was higher or lower than the average for the year?

* Not including Monson and Bridgewater (State Almshouses), Hyde Park and Hudson.
† Not including Tewksbury (State Almshouse).

(If your attention has not been given to the height of subsoil water as marked by the wells, will you have the kindness to note it in future epidemics, and let us know the result?)

Replies.

Rising after being very low,	.	.	.	11
Falling,	.	.	.	16
Very low,	.	.	.	36
Have not observed,	.	.	.	100

3. Have you observed any connection between typhoid fever and foul soil, whether from privies, pigsties, manure heaps, or similar collections of decomposing matter lying on the ground?

Replies.

Yes,	.	.	.	.	.	79
No,	.	.	.	.	.	45
Doubtful,	.	.	.	.	.	39

4. Have you observed any connection between typhoid fever and putrid air, whether from rotting vegetables in cellars, bad drains, unventilated living or sleeping rooms, or from any other cause?

Replies.

Yes,	.	.	.	.	.	90
No,	.	.	.	.	.	36
Doubtful,	.	.	.	.	.	37

Ten towns report that typhoid fever is a disease almost unknown among them, and for this reason they can give no information.

The following are the replies on this interesting subject in the form of opinions based on professional experience, from our correspondents in the various towns.

Andover. "Something more than twenty years ago there appeared in one of the English medical journals an article written with much ability, the object of which was to show that the defective sewerage of London was the cause of a large amount of sickness. Statistics were given running through a series of years, showing that the mortality from *bowel complaints* and fevers had

been uniformly inversely to the amount of rainfall to wash out the sewers, particularly during the hot months. The statistics were of this kind. In the month of — from the 20th to the 30th there was no rain sufficient to wash out the sewers, and the mortality from these diseases was constantly increasing. On the 30th, a heavy rain, followed by a diminution of the mortality; but, as no more rain fell for the next twelve days, the mortality again increased till another rain, and so on.

“Some sixteen years ago I was mentioning this to a very intelligent and observing man and an old resident, who stated that the same had always been true in this town. My observation since that time has convinced me that he was entirely correct. The English writer's conclusions with regard to defective sewerage I cannot regard as proven. The statistics only go to show that the mortality from these diseases is inversely to the amount of rainfall. The less rain, the more typhoid fevers and other cognate diseases I apprehend is the rule or law the world over, not only in the cities but in the country also. But the fevers thus caused may not be developed until after more rain and the water in the wells is again rising. I believe that the law is not confined entirely to the summer season, and to fevers and bowel complaints, but is of more general application to nearly all (especially acute) diseases, and to all seasons of the year. Rain is undoubtedly the great purifier of the atmosphere from the causes of disease.”

Our correspondent, in a subsequent letter states that from personal experience and observation in Siam he finds confirmation of the views above expressed.

Attleborough. “In localities where typhoid fever prevails, foul soil or foul air, under conditions corresponding to questions three and four, have almost always been detected. Still, I have seen some very striking instances of immunity from typhoid in positions where the pythogenic influences were conspicuous, and where the assumed fever producing elements must have existed in a concentrated form. In view of these exceptions, I have been compelled to think that there must be a preparatory receptivity in order to make the exciting influences noxious.”

Amherst. “Typhoid fever is a common disease here. * * I have now in mind a house where, at one time, fever seemed endemic. The cause was found in decaying vegetables and filth in the cellar. These being removed, the disease disappeared.”

Ashland. "The most unhealthy part of our village is not on the plain but is a street extending along the south side of a hill. During the past two years there have been cases of typhoid fever on this street quite out of proportion to the number of inhabitants. Two years ago this location was a piece of woodland. It was cleared, and ten tenement houses erected on it for the accommodation of twenty families. Soil, a gravelly loam resting on a gravelly subsoil and very rocky. The land is springy, and water stands in the cellars of these houses five or six months in the year. No pigsties; and privies five rods distant from the houses. Water from wells. From the land having been so recently cleared, there is much decaying vegetable matter on the ground and in the soil. The structural ventilation of these houses not more deficient than other houses of the village, but as there are no shade-trees, and the houses stand on the south side of the hill, and all the roofs are flat and covered with a black composition absorbing much heat, the air of the sleeping rooms in summer was exceedingly hot. We may say that the ventilation of the houses was virtually poor.

"We may consider the practical facts presented in this connection to be these: That quantities of decomposing matter, whether from pigsties, privies, vegetables in cellars, or *decomposing leaves of newly cleared land*, combined with *dampness* and *deficient ventilation* may be among the causes of typhoid fever; bearing in mind that the disease is propagated by contagion. Another thought worthy of notice is the question of the influence of the mind as a predisposing cause. All the inmates of these houses were strangers in town; families imported by the factory company from different parts of the country. Strangers in a strange land, away from all the sympathies of friends and neighbors, subject to all the emotions of home-sickness, depressed by the uncertainties of new undertakings, and constantly undergoing the fatigues of toil."

Athol. "Typhoid fever has not prevailed to any great extent during the past eight years. Most of the cases have occurred in a certain part of Athol proper. In this locality the land is very high, the soil cold, thin and marshy; no running water, no drainage. There is no known impurity in the well water. Connection has been traced in this locality between typhoid and foul soil and air.

"On the other hand, cases have occurred in various localities where no connection seemed to exist with these causes."

Ashburnham. Last autumn there were some thirty cases of typhoid in town; no cause recognized. Water mostly from springs.

Beverly.—Our correspondent reports ten cases of typhoid of a very severe type, occurring in one family, in November, 1865. The house stands near the ocean, but on a hill seventy feet above high-water mark. The hill slopes in every direction from the house, and is mostly rock. The house is built on rock, is large and airy. The cause of the fever was found in the following circumstances:—The privy was only about eight feet from the house and exceedingly foul. The sink spout ran into a hogshead, and the odor from this and the ground immediately about it was intensely putrid. Two families occupied the other end of the building, and no cases of fever occurred among them. About seventy persons acted as watchers and attendants upon the sick family, and not one took the disease. The weather before this outbreak of fever had been very wet, and, just previous, very hot and dry.

Berkley.—“There is one house where typhoid fever has been more prevalent than in any other in the town. Its situation is as follows: Soil dry, gravelly and sandy; on the south is a course of swamps with water sometimes a little stagnant; on the north is a deep pond-hole with some vegetation growing in it, quite near the house, and surrounded with hills on the north-east, north and north-west. When in the fall of the year the wind blows for some time from the north-east, over the woody hill and across the pond-hole, I expect typhoid fever in that house, and I have not often been mistaken. I have observed this for the past twenty-six years.”

Brookline.—Our correspondent gives the result of his observations during twenty years of practice in this town. He writes as follows:—“By consulting the town records I find that during the ten years, 1860-1869 inclusive, there were but twenty deaths from typhoid fever. Of this number fifteen were in the class who live in well-built comfortable homes, and five in the crowded homes of the poorer and laboring classes. I have been unable to obtain the relative numbers of these two classes of our population, yet my experience has been that the poorer class has not been so liable to typhoid fever as the wealthier portion of the community.

“The larger proportion of typhoid cases which have been under my care in the fall of the year must be referred to epidemics or atmospheric influences existing in other towns where the subjects of the disease had been visiting. One fatal instance this autumn commenced ten days after the patient returned from Conway, N. H. Four individuals in one family had very severe typhoid, one at Nahant, and three after returning thence to Brookline. And

so with nearly all the cases I remember during the past six years. Although I believe in the necessity of careful drainage, I must say that I have never had cases that I could attribute to bad drainage, but many that I could trace to decaying vegetables in cellars.

"I have always supposed that moisture and heavy fogs had a great deal to do with the existence of typhoid fever, as it has been the scourge of towns in the vicinity of rivers and brooks, and where large extents of meadow land were uncovered by the heat and evaporations of summer.

"In 1846 or 1847 a serious and malignant epidemic of typhoid-dysentery raged on Bradlee's Hill, and in the houses in the vicinity of the reservoir, then in process of construction, in a locality which in other years had been healthy. At that time, I attributed the epidemic to the turning over and exposure to the air of the meadow mud filled with decaying roots and other vegetation. Something of the same kind occurred in Brighton, on breaking ground for the Brighton reservoir, but owing to the smaller number of houses in the neighborhood the epidemic was less noticeable.

"It is the custom in Brookline at this season to cover the grass and garden-beds around the houses with manure, often taken from the pigsty, filling the air with an intolerable stench. To be sure the frost soon checks decomposition, and the rains wash out the odor, yet we might expect this practice would excite disease, but I have not noticed any such result."

Boston.—The answer to the first question of the circular of May 1st, requires a comparison to be made, as regards typhoid fever, between the Boston of a quarter of a century ago, and the Boston of to-day. Previous to 1848 the water supply of the inhabitants was to a very limited extent from Jamaica Pond, but in by far the larger portions from wells. These wells were very numerous; almost as much so as the privy vaults with which they were in close proximity. After an extensive fire, such as frequently occurred at that time, the foul character of the soil drained by these wells was very evident. The water nevertheless was, although "hard," generally clear and sparkling, as is not unusual with water containing a large proportion of nitrates, the result of decomposition.

The water of Lake Cochituate was brought into Boston in the autumn of 1848, and was very soon received by the whole population. The wells were abandoned and filled up, or now only exist as receptacles for dirt and rubbish.

We have endeavored in various ways to ascertain the relative

frequency and severity of typhoid fever before and since the introduction of the unquestionably pure water of Lake Cochituate.

The following table gives the number of deaths for each year from 1846 to 1867, reported as from typhoid or typhus. Previous to 1846 no record was made.* We have therefore only the three years 1846, 1847 and 1848 to compare in statistical form with the nineteen subsequent years. Moreover, the year 1847 was marked by the importation of a great number of cases of true typhus, known here as "ship-fever," occurring among the immigrants arriving at this port.

It is unnecessary that the distinction made by physicians during the past thirty years between typhus and typhoid, should be enlarged upon in this connection, but it is important to remember that the two diseases were confounded by every one before that period, and that true typhus, although occasionally originating here, is a rare disease, while typhoid is exceedingly common. For our present purpose, with the exception of the ship-fever of 1847, the two forms of fever may be regarded as one. Our oldest physicians (while recognizing the differences, which have been perfectly defined) still speak of typhoid as typhus, and we wish to be understood as classing together these two nearly related forms of continued fever.

With this explanation, the following table may be taken as a close approximation to the truth with regard to mortality from typhoid fever in Boston :—

* Since the above was written we have seen an old record of deaths and their causes in Boston for nearly every year, from 1825 to 1846, which is preserved at the office of the City Registrar. Although this record is too imperfect for use in statistical form, it seems right to say that it gives the impression that while typhoid fever was somewhat more fatal, and therefore probably of more frequent occurrence, in those years than at the present time, it would be wrong to suppose that the death-rates, which prevailed in 1847 and 1848 were the rule previous to the introduction of pure water. Those were exceptional years in so far as we can discover, and the great mortality from fever was due in part at least to the importation of foreigners who brought disease with them.

*Table of Deaths from Typhoid and Typhus Fever in Boston,
1846–1867.*

(Previous to the Annexation of Roxbury.)

Y E A R.	Typhoid.	Typhus.	Totals
1846,	—	133*	133
1847,	—	666*†	666
1848,	—	288*	288
1849,	80||	119	149
1850,	43	61	104
1851,	82	88	170
1852,	66	46	110
1853,	67	44	111
1854,	64	38	102
1855,	78	12	90
1856,	70	6	76
1857,	83	3	86
1858,	73	2	75
1859,	85†	—	85
1860,	—	110§	110
1861,	—	96§	96
1862,	74†	—	74
1863,	130†	—	130
1864,	107	10	117
1865,	125	12	137
1866,	93	8	101
1867,	88	3	91

* Reported in First Annual Report of Registrar (1849), taken from previous records.

† Includes 386 deaths from ship-fever at Deer Island, City Poor-House and House of Industry.

‡ Typhoid and typhus together.

§ Note to Annual State Registration Report for 1849:—"This county (Suffolk) was never complete till 1849, the city of Boston never having complied with the law prior to that time."

¶ Taken from State Registration Reports for 1860 and 1861, no municipal report of the Registrar having been made in those years. The figures for these two years include all of Suffolk County, and also include "cases of infantile fever classed with those of typhoid, relapsing and other continued fevers under one name—typhus."

Table of Deaths from Typhoid Fever in Boston, compared with a fixed number of the living in each year.

Y E A R.	Population.	Deaths.	Deaths to 10,000 living.
1846,	116,865	133	11.4
1847,	122,846	800	24.5
1848,	127,827	288	22.5
1849,	133,308	149	11.2
1850,	138,788	104	7.5
1851,	142,693	170	11.9
1852,	146,598	110	7.5
1853,	150,503	111	7.4
1854,	154,408	102	6.6
1855,	158,313	90	5.7
1856,	162,218	76	4.7
1857,	166,123	86	5.2
1858,	170,028	75	4.4
1859,	173,934	85	4.9
1860,	177,840	110	6.2
1861,	180,735	96	5.3
1862,	183,630	74	4.0
1863,	186,526	130	6.9
1864,	189,422	117	6.2
1865,	192,318	137	7.1
1866,	195,214	101	5.2
1867,	198,110	91	4.6

An examination of these tables shows that typhoid fever is less fatal now than when the registration of the causes of death was commenced, and it shows a very marked diminution in the number of deaths in the years following an abundant supply of pure water. This may be attributed not only to the improved character of the drinking-water used by the people, but also to the constant flushing of the drains and sewers, by which much material which had previously been retained there in a state of putrescence, particularly during seasons without rain, was washed into the sea.

But the statistical evidence is not all which goes to prove the effect of Cochituate water on typhoid fever in Boston.

Inquiry has been made of our oldest physicians for their opinions on this point, based upon professional experience. Their testimony is almost unanimously to the effect that since the period when pure water was introduced, typhoid fever has been less frequent and less severe. The following extracts from the reply of a gentleman whose professional experience extends over a period of fifty-five years will be read with interest:—

“I have noticed since the time when Cochituate water was introduced that typhoid fever has been less frequent in proportion to the population, and generally mitigated in its character. * * * * * At the early part of my professional life, fever of a severe type was quite common, much more so than it was a few years later, and the cases were of a more serious character than at any subsequent period. * * * * * Cases of what is now distinctly recognized as ‘typhus’ were not then uncommon; they are now comparatively rare. Mild cases of ‘typhoid’ fever, such as have of late been most common, do not readily arise to the remembrance of the practitioner of that early time. * * * * * From the period referred to down to the time of the introduction of Cochituate water, fevers had still been gradually lessening in frequency and severity. It has been noticed that since the introduction of pure water the diminution of typhoid fever, both in frequency and virulence, has been still more marked.”

How much of this improvement is due to better drinking-water, and how much to the better drains and sewers, how much to the free supply of water to wash away impurities, how much to the more rational treatment of fevers, our correspondent thinks may not be determined; but,

“Taking into view the fact that fevers have become comparatively less frequent, and much mitigated in severity since the introduction of pure water, the inference is just that much of the benefit derived is due to this cause.”

With regard to the second inquiry of the typhoid circular, we are unable to answer with precision. Wells being disused in Boston, the height of water in the soil is not as readily ascertained as in the country.

The extension of land over the sea which has been going on in Boston for many years has been attended with a contest between the waters of the land and the waters of the sea for possession of the subsoil, a contest in which fresh water speedily triumphs. Soon after the filling is made the water is salt, then brackish, and, in a few months, fresh.

This has been the case wherever the filling has been made with porous material. The pressure of rain-water received upon the surface of the new-made land, combined with that flowing down from more elevated points, is evidently greater than the pressure of the water of the ocean, so that we meet even now on the gravel-filled territory south and west of the Public Garden with fresh water below the level of the tide, just as is described by our correspondents of Cape Cod and Martha’s Vineyard.

The reply to be made to the third and fourth questions of the circular of May 1st, must be that in Boston the ordinary collections of filth found in crowded localities, in dirty houses, in foul privies

and stables and streets and alleys,—the combination of all those impurities which make Boston stink in the month of August, does not especially invite epidemics of fever. The city is more free from typhoid than the country. We have to pay the penalty (and a heavy one it is) in other forms of disease, but not in this.

A very considerable number of the cases of typhoid treated in Boston during the autumn originate in the country and at seaside places where families from the city have passed the summer.

We cannot assume to fully explain the comparative exemption of Boston from typhoid, but there are some things in this connection which, whether they are causes or coincidences, it is well to remember.

The drinking-water is, beyond all question, free from contamination by putrefying material. The soil is well covered by pavement, or by macadamized streets, or thoroughly packed gravel, and is not often disturbed to any great extent.

People do not live in large numbers on the ground floor; a very great majority sleep in rooms twenty feet at least above the ground. Cellars are very seldom used for the storage of vegetables. Piggsties are unknown. Drains and sewers receive the liquid slops of the kitchen and convey them to the sea. Liquid filth is not often poured upon the ground.

The older parts of Boston are more filthy from overflowing, neglected and broken privy-vaults, than any country place can possibly be; but they do not contaminate the drinking-water.

The influence of obstructed drains and of emanations from untrapped sinks and water-closets is as evident in Boston as elsewhere. In Kearsarge Avenue, Boston Highlands, is a block of three brick houses, built seven years ago. They are situated on the slope of a hill, with good natural facilities for drainage. The neighborhood is an excellent one. In these three houses there occurred in the autumn of 1868 eleven cases of typhoid fever; and in the adjacent houses, whose rear came against the block, there were two cases.

Of the thirteen cases, two were fatal. One of the attending physicians states that at his suggestion the common sewer of the block, which was laid along the rear of the houses and into which the drains of the houses emptied, was examined. It was found to be effectually obstructed by a mass of rubbish, including crockery, tinware and ashes, so that the fluids accumulating above this plug had over-flowed, saturating the ground beneath the houses and infecting also in some degree the soil beneath the adjacent block. The workmen engaged in taking up the drain and repairing it were nauseated and were obliged to desist at intervals from their work.

The physician stated further that the typhoid epidemic in that neighborhood subsided soon after the nuisance was abated.

The following history of a single case of typhoid fever has been furnished for publication at our request, by an eminent practitioner. Although not referring directly to the special object of this inquiry, it throws so strong a reflected light upon the causes of disease, and is itself so striking an example of the value of hygienic treatment, that we cannot doubt the propriety of reporting it in this connection :—

“ A young and apparently vigorous man, between twenty and thirty years of age, a butcher by trade, was attacked with typhoid fever in the autumn of a few years ago. I saw him soon after the fever commenced, and attended him through the whole of it. He was a bachelor and occupied a good sized chamber in the second story of a house in Pleasant Street. The chamber was lighted by two windows, and furnished with an open fire-place in a chimney.

“ The fever was a mild but unmistakable typhoid, which developed itself normally. The patient had a daily febrile exacerbation, a hot skin, thirst, a slight diarrhoea, rose-spots and the like. There were no violent symptoms, and consequently no indications for active treatment. In fact I saw no reason for the exhibition of drugs, and therefore gave none. His skin was bathed two or three times a day with tepid water. A slight wood fire, just enough to insure ventilation, was kept in the chimney of his chamber, and one of the windows raised a little. He was allowed to drink as much water as he chose, iced or not according to his taste. In like manner the covering of his body was regulated by his sensations; when hot he had only a sheet over him, at other times he required a light blanket.

“ As soon as the fever was sufficiently developed to render its character clear I advised his landlady to inform his family, who resided at a distance from the city in Vermont or New Hampshire I think, of his illness, and to add that he was not dangerously ill.

“ Directly the news reached his family a maiden aunt and sister were despatched to the city to take care of him. Alarmed by the name, typhoid fever, they hurried to Boston and reached his quarters one forenoon, just after I had made my customary visit. My patient was in the condition described above, comfortably sick, with a pulse of about eighty and without delirium. They were frightened and astonished to find their relative, who was sick with typhoid fever, so poorly cared for. Guided by their theory of the proper treatment of fever, they proceeded without informing me to reform matters.

“ They pinned a blanket over each window so as to exclude the light, and closed the open window so as to shut out the noise of the street. A fire-board, or chimney-board I believe it is called, which had been removed from the fire-place was replaced, and an ‘air-tight’ stove, in which a fire was built, was substituted for the open fire. In order to make him sweat he was packed in two or three blankets, and the diaphoretic process encouraged by copious libations of herb tea. The fact that no medicines were given they regarded as an unpardonable neglect on the part of the attending physician.

but until they saw me were content to make up for this neglect by giving the hot teas just referred to.

"When I reached the house on the next day for the purpose of visiting my patient I was met at the door by the landlady who informed me that he was much worse. She gave me no hint, however, of the transformation in his surroundings that had taken place. I went up stairs and was surprised beyond measure at the change. I found a dark room, filled with a hot and foul atmosphere. The odor was of that offensive sort that the chambers of the sick are too often charged with. But the greatest change was in the sick man whom I had left so comfortable the day before. He was wrapped in blankets, his skin was dry and very hot, his tongue dry, his lip cracked, his eye wild, his pulse one hundred and twenty, and he was so restless and delirious that it was all his attendants could do to keep him in bed.

"The maiden aunt approached me and introduced herself and niece. She said she came to nurse her nephew, and had found him with open windows, exposed to noise and currents of air, drinking cold water as freely as he chose, and taking no medicine. These evils she had endeavored to remedy, but in spite of all her efforts he had grown rapidly worse. She said this with such downright honesty and sincere simplicity that I could not be provoked with her. I asked her to step into an adjoining room, and told her that unless everything about her nephew was arranged just as it was before she came, I should take no further care of him. As she hesitated a moment, I added, 'he will probably die left as he is, and it is for you to take the responsibility of following your own course or mine.' We returned to the sick-chamber. I remained and saw her with trembling hands and doubtful looks remove the blankets from the windows and from the bed. The air-tight stove and the chimney-board were taken away. A fire was built in the chimney and a window opened. I gave the sick man a tumbler of water, which he drank as if he were quenching an internal fire. All this they bore in silence, but when I called for a large tub, and made preparations for a bath, they remonstrated. A bath, and particularly a cold bath, would kill him.

"Remonstrances were unavailing, and they were compelled to acquiesce. My patient got a cool affusion by pouring water all over him. He was then put to bed, lightly covered, and soon went to sleep. By night his condition had considerably improved, and on the next day, twenty-four hours later, his fever assumed its previous mild type. His pulse was about eighty, and his head tolerably clear. He made a satisfactory convalescence. His relatives returned home in due time, and if they are alive I hope they are the apostles of a rational treatment of typhoid fever."

Brimfield.—An experience of twenty years has satisfied our correspondent that the most prolific sources of typhoid fever are found in the conditions mentioned in the third and fourth questions. "Many and many a time" he has traced such connections.

"We have every year a few cases of typhoid fever, and in nearly every family where it has occurred in the past three or four years, I have thought it originated from decaying vegetable matter."

Bridgewater.—"Whenever I have had several cases of typhoid fever in one house or neighborhood I have usually found what I considered the cause; either a wet cellar with decaying vegetables, or a sink-drain running into a pool near the house for the purpose of making compost."

Brewster.—"Typhoid fever has in some instances seemed to be caused by bad drains, but in my opinion by far the most fruitful cause has been the emanations from low, wet, swampy grounds, and fresh-water ponds, of which the bottoms were partially exposed from evaporation in dry seasons."

Cambridge.—"I have not been able in the cases of typhoid fever I have seen to trace any connection between this disease and impurity of water, of soil or of air. I have seen the disease alike in the dwellings of the rich and of the poor, of the clean and of the filthy, in wet and in dry places. The only endemic of typhoid fever which we have ever had occurred some twenty years ago, and the cases were almost exclusively on the comparatively high land between Cambridgeport and Old Cambridge, in families provided with the comforts and, a large part of them, with the luxuries of life, in houses comparatively well ventilated, and containing nothing so far as could be discovered, to render the air impure."

Chatham.—"This town is situated at the heel of the Cape on a peninsula almost devoid of trees, and is almost continually swept by the wind. We have very few cases of typhoid, and those of a mild type. The disease is much more prevalent in East Harwich where my practice extends. That locality is well wooded, and there is much more fresh water. While practising in Wareham (head of Buzzard's Bay), I noticed the same peculiarity, which strikes me as being more than a coincidence. Most of the typhoid cases were in the adjoining town of Carver, which is interior, and where there is much fresh water and low meadow land; Wareham being unlike it in these respects."

Conway.—"According to my observation, *putrid air* from decaying vegetable matter and foul sink-drains, with poorly ventilated sleeping room, constitute the most frequent cause of typhoid fever."

Chester.—"Typhoid fever prevailed here constantly in 1858 and 1859 without regard to water or weather."

Concord.—"In two epidemics of typhoid, soil in the immediate vicinity of the cases was broken for the first time, and exposed to a hot and dry air in a season of drought. In one instance, in making a railroad a knoll was cut through and the dry, gravelly soil was carried forward to fill a depression by the side of a street occupied by several good houses. The work was done in the winter and spring. The subsequent autumn was dry and hot and the springs very low; fever occurred in nearly every house—from two to five cases.

"In another instance extensive stone quarries had been laid open, and large quantities of earth exposed for the first time. The wells were very low so that it was difficult to obtain water. In August, September and October following, many of the workmen, mostly stout men from the country, were affected with severe typhoid. I had ten cases at one time, some lasting six weeks, but all recovered."

Coleraine.—"I have failed in most cases, but not always, to observe the connection referred to in question 3.

"With regard to question 4, negligence in these respects, is common among the rural population; but often the most negligent families seem to escape. Still I have often found such carelessness in infected families. I think the bottoms of mill-ponds in times of drought are fertile sources of typhoid fever."

[NOTE.—See also "Health of Towns."]

Dartmouth.—"My experience is that typhoid fever prevails in its most malignant form in low, damp places, where rooms are but poorly ventilated, where cellars are overflowed, where drains are bad, and where decaying animal and vegetable matter is found in and around the building."

Dennis.—"In eighteen years' practice I have met with many cases of typhoid. They have generally been imported. For instance, a father, who is master of a vessel, comes home with typhoid fever, and there is a pretty good chance for it to go through the family, let the subsoil water be high or low.

"In a neighboring town I have seen well marked instances of typhoid caused by partially draining a swamp.

"Our people every year put fish under corn-hills, and it makes a most dreadful fetor for about ten days, but no disease results therefrom to my knowledge."

Dudley.—Our correspondent has observed an apparent connection between wet cellars and the habit of sleeping on the ground floor, and the origin of typhoid fever.

Erving.—“Last August three persons in one house died of typhoid fever. The cause seemed to be a pool of stagnant water and decaying vegetable matter within thirty feet of the house.”

Essex.—Typhoid fever was prevalent here in the summer and autumn of 1869, but no cause could be distinctly traced.

Fall River.—“In the autumn of 1867, about forty cases of typhoid fever occurred in one locality where a large number of houses had been recently built, and filled with French Canadians as soon as completed. The water was from wells just dug. Every form of filth was thrown on the ground, and left exposed. This locality is now well sewered and is as free from disease as any part of Fall River.

“The following year a large number of cases of fever occurred in another neighborhood. Here also the houses and wells were new. An examination of the premises showed that the pipe leading to vaults containing refuse matter and filth of all kinds, was so arranged as to allow the foul air to escape directly into the houses. These pipes were properly trapped, and no cases of typhoid have since occurred.

“In both years referred to (1867 and 1868) the typhoid fever in town was confined almost wholly to new comers, to the French recently from Canada.”

Franklin.—“We have but little typhoid fever. What seems strange to me is the fact that I see so many places where the sink water is deposited at the back door, and no apparent evil results follow. On the other hand I have had cases in families where the surroundings seemed conducive to health. I remember one instance six or eight years ago in which three families, comprising about sixteen persons were affected. Of this number twelve had the fever. The fathers of these families were brothers and lived quite near each other. I could discover no local causes. Those who were in the sick-rooms during the night took the fever, while a man-nurse, who remained only during the day, escaped. It was cold weather, but the nurse kept the windows open while he was in the house. These families had been previously well, and have continued well ever since, living in the same houses and with the same surroundings.”

Fitchburg.—Water from wells in the valley occupied by this town is believed to be deteriorating from the increase of population, but no connection with typhoid is remarked by our correspondent. "An epidemic of typho-bilious fever occurred in 1865 when our wells were very low and continued till the November rains of that year." Soil, very variable in different localities,—some clay bottoms, some gravel, a good deal of rock, very little alluvial soil. "The Nashua River makes a serpentine course of ten or eleven miles in crossing the town which is six miles wide. My experience of thirty-two years in this region leads me to believe that we have more of typhoid fever on the high land or on the *summits between the water-sheds*, than in valleys or low lands."

Great Barrington.—"Whenever called to a case of typhoid fever, I have been able to trace the origin to some local cause in every instance." The above opinion is the result of twenty years' practice. Our correspondent is very decided in the expression of his opinion that foul soil and air and water are the causes of typhoid fever.

Grafton.—Our correspondent finds no difference as regards the causes of fever between the water of springs or wells and other sources, provided the water be of good quality, but remarks, what others have also observed, that patients suffering from typhoid often manifest a singular longing for the water of springs or wells in the vicinity of a former residence.

"I have noticed that a connection between typhoid fever and foul soil seems to exist; occurring more generally and assuming a more grave and malignant type under these circumstances, sometimes seizing a whole family, or even many families in a neighborhood, until the cause was abated. Many cases, not only of typhoid, but of dysentery (the latter, perhaps, especially,) have originated in foul soil and putrid air within the range of my practice."

Gloucester.—"I have always found typhoid fever most prevalent and malignant where the air has been rendered impure from the causes enumerated in the fourth question of the typhoid circular." [See also "Health of Towns."]

Hadley.—"Some twenty years ago I attended upon a family consisting of a father, mother and nine children. The mother and eight children had typhoid fever. After the first case of fever, four of the children, who showed no signs of illness, were placed in

as many different families, three of them being at a distance of two or more miles from their home. They, however, exhibited signs of the disease as soon as those remaining at home. As to the cause,—there was a slaughter-house at the distance of one-third of a mile from the house. The proprietor had spread the accumulation of his hog-yard with the butchers' offal upon a low, wet piece of ground lying between his buildings and the house of his neighbor. Whenever the north-west wind blew, the stench was perceptible to all in the vicinity. I noticed it many times in riding by. I have always believed that the fever must be attributed to the influences proceeding from the manured field above mentioned.

"Thirty years ago, a clergyman built a house in this town, with a fine cellar extending under all portions of it. He dug a well under the L portion. The well was not covered, and consequently the floors of all the lower story were kept damp by evaporation. The sink-pipe ran down near the pump into a wooden spout, which passed under ground to a closed box, situated about fifteen feet from the cellar wall. The foul air from the box and drain had no means of escape, excepting through the drain back into the cellar. The cellar was also used for the storage of whatever vegetables were used in the family. The windows of the cellar were never taken out. There was no escape for the moisture and foul air, except by permeating the floors. Water stood in drops upon all the timbers and boards.

"After a few months' residence in the house, the minister's wife died, of fever so far as I can learn. He soon married again, and within one year of the death of the first wife, the second died from, as I understand, the same disease. His children were also sick. He lived in the house about two years. The next occupant was a man named B——. His wife was desperately sick. A physician then took the house. He married, and his wife died of the fever. Another physician was the next occupant, and he, within a few months, came near dying of erysipelas. All this while matters had remained as before described, with reference to ventilation. A school teacher then rented the house, and tore up the closed box, but did not cover the well. This was about eight years after the building of the house. The sickness and fatality were so marked, that the property became unsalable. When last sold, every sort of prediction was made as to the risk of occupancy, but by a thorough attention to sanitary conditions, no such risks have been encountered.

"For the following circumstances, I take popular statements as the only evidence available. In North Hadley is an extensive mill-

pond. About thirty years ago the water was drained off to make repairs during the summer. It had islands and many shallow places, on which there was a rank vegetable growth. There was consequently much decaying material from the exposure. Typhoid fever swept through the village, causing great mortality. No one here has ever questioned the fact that the draining of the pond was the cause.

"It is a fact, that within forty or fifty years, many ponds have been permanently dried up in the roads, and instead of there being a frog-pond in every farm-yard, there are now almost none. The drainage is greatly improved, land better cultivated, and sanitary laws better understood and acted upon.

"In those days the 'fall fever,' as it was called (really typhoid), was the dread of the people. One fall is spoken of in which there were twenty-two deaths from this cause, in an area of territory occupied probably by not more than twelve hundred people. Dysentery of a very fatal type was also a very common disease. Typhoid fever is now comparatively rare."

Holyoke.—"In the fall of 1869 cases of typhoid were quite numerous, but the disease prevailed in a greater or less degree through this entire valley, and could be traced to no special cause or causes. This year (1870) only three cases have come under my own observation. They were persons of exemplary habits, lived in the most healthy parts of the town, remote from each other, and I confess myself at a loss to know why they should have been ill at all."

Harwich.—"In this town the condition of some seventy-five to a hundred acres of territory lying south of and in close proximity to the principal village, has been the subject of much discussion. It was formerly covered with water to a depth of several feet, and known as "Grassy Pond." Of late it has been almost completely drained during a part of the year, for the cultivation of cranberries, to which use about one-third of it is now devoted, the remaining two-thirds being covered with rank grass. A ditch and many holes remain, partially filled with water. [This place was visited by the Secretary July 25th, 1870, at the request of the selectmen of Harwich.]

Our correspondent says of this place and its effects on those dwelling on its borders: "I have always freely expressed my opinion with regard to the cause of the sickness in the neighborhood of 'Grassy Pond.' It is due to the decomposition of vegetable and animal matter. My attention was called to it some ten

or fifteen years ago, when the cranberry culture commenced, and when the pond was partially drained. Since that time sickness has, on the whole, increased in this vicinity, though not in every year. In 1863, there were about forty cases of typhoid dysentery within one mile of the pond, on the northerly side, including in the area, I should judge, not more than thirty or forty families. At that time not a case of the kind occurred in any other section of the town."

Another physician of the town has given similar testimony.

Huntington.—Our correspondent states that typhoid fever is a very frequent disease, and is decided in the expression of his opinion that it may very commonly be traced to some local foulness as the cause. "In the winter of 1868 I attended six cases of typhoid in one house, on high and dry ground with good cellar and good water. I found no privy. The family for two years had made use of the vacant lot in the rear of the house. No other cause for the disease was found; this seemed sufficient."

In a subsequent letter it is stated that "persons coming here from other places have seemed most sure to have the fever, unless protected by a previous attack; from this I judge that there is some local cause operating here. Our village is low. Two large streams (the south and west branches of the Westfield River) pass through it. The fever, however, seems equally prevalent on the hills for miles around as in the valley. The autumn and winter of 1868 gave me fifty cases, about equally divided between the villages, and the country five miles around. I have usually found, on close investigation, some immediate and direct local cause on or about the premises. Our cellars are many of them damp, sinks foul, and the people blind to the importance of these things. In 1867, in one house where there were nine cases of severe fever, a drainage from a wet-sink, into which all the slops were thrown, had established itself to the well from which the water for drinking and cooking was obtained. In nearly every case some local cause was ascertained, in some instances apparently slight.'

Hingham.—Typhoid fever is a disease of very rare occurrence in this town.

Hudson.—"We had a great number of cases of typhoid fever and typhoid dysentery six years ago, caused, as I suppose, by the decaying vegetable matter from a pond in the village, which was drawn off for the purpose of repairing a dam.

“Wherever I have seen typhoid fever in ill-ventilated rooms, or where the surroundings were foul, the fever has been of a low type, and has proved more fatal.”

Hanson.—“I have found typhoid fever to be more prevalent in low, wet and foggy locations, and have sometimes been suspicious of the influence of foul cellars.”

Hyde Park.—“Typhoid fever, a disease of common occurrence. Have found foul privies on the premises, where repeated and fatal cases of typhoid have occurred, but have not always so found them. Do not think connection can be traced with other causes mentioned in third question.”

Kingston.—“We have but little typhoid fever. No epidemic for twenty years. I had five cases in one neighborhood last year in houses supplied with spring-water. Also two other cases in a house with a wet cellar and near a mill-pond, which had been drawn off.”

Lenox.—“Nearly every case of typhoid in my practice can be traced to foul privies, decaying vegetable matter, obstructed drains, or wells below the level of cess-pools, privies, or manure heaps.”

Leominster.—“Typhoid was prevalent in the fall of 1869, but except in four families the cases were isolated, scattered over different parts of the town, and without known or suspected cause. In the first of the excepted families there were five cases in a family of eight. In the second, four miles from the first, there were four cases in a family of six. In the third, far removed from either of the others, there were seven cases in a family of ten. All three of these families were farmers; the water used was derived from open wells at some distance from the houses, with no possibility of anything running into them, as the ground around the wells was higher than the surrounding surface, and far removed from any contaminating cause existing upon the top of the ground, such as privies, drains, manure-heaps, &c. The water in the wells was rising, and remained higher than usual on account of the heavy and then recent rains. The houses of these three families were all on elevated ground, with no wet or swampy ground in their vicinity. The fourth family consisted of boarders, forty-one in number, operatives in a woollen mill. Twenty-two were within a few days seized with typhoid fever. The cause of the disease in this instance was apparent. *The drain of the sink had found access to the well.* A new well was dug and no

more cases occurred. For the last thirty years I have observed that typhoid fever prevailed here most extensively in those years in which the summer was dry, followed by a wet autumn."

Leverett.—Typhoid fever is an annual epidemic in the village, which is built on the banks of a rapid stream, having five dams supplying power to as many mills. The cause of so much fever in the village is not, in the opinion of our correspondent, stagnant water, but more probably a cider-mill, where the pomace from the apples is heaped up yearly and left to ferment, so that in the hot season, with a west wind, the odor can be perceived throughout the village. There is now a great mass of this pomace which has been accumulating for years. There is a good deal of fever in this section of country, but more in the village than in all the rest of the town.

"An epidemic of typhoid occurred here some time since from the flowing of a meadow, and then draining it. After it was drawn off every family living around the pond had typhoid fever. I have observed that if one member of a family is attacked some of the others are almost sure to be if the rooms are small and ill-ventilated. Among the causes of typhoid which I have observed, may be mentioned, slops thrown on the ground, putrescent puddles from sinks under the window, rotting vegetables in cellars. Typhoid is often caused by decaying vegetation, ceasing after a hard frost. I have had cases occur after digging muck in swamps, and working around ponds that were drying up.

"Two years ago three boys went in swimming in a foul pond of water. In just two weeks afterwards they were all taken down with severe typhoid fever."

Littleton.—"I have observed that typhoid fever has assumed a graver type when the cases have been near a slaughter-house. It seemed to be aggravated by the impure air arising from the decomposing animal matter."

Lawrence.—"Many cases of typhoid fever occur in overcrowded and ill-ventilated sleeping-rooms, as well as from all the causes mentioned in the fourth question."

Lowell.—"In reply to your questions concerning typhoid fever, I would say that no opportunity is afforded in this city for observing the difference in the prevalence of the disease between houses supplied with water from wells and those supplied from springs or ponds. All our water is from wells. This water, in the thickly

settled localities, is highly charged with impurities. The worst example is a well on the corner of Lowell and Dummer Streets, which is exposed to the washings of streets, and the drainage of vaults and sewers, filtered through a few feet of earth. A gallon of this water contains fifty-two grains of inorganic and twenty-five grains of organic residue, but in spite of this impurity it is not unpleasant to the taste, and is used by at least one hundred families. Works are now being constructed to supply the city with pure water.

“During the year 1869 there were thirty-four deaths from typhoid fever in Lowell; a greater number than in any year since 1857. With a view of answering your inquiries, I have looked up the recorded residences of the deceased, and found, contrary to my expectation, that this disease was less fatal in the filthy than in the well-ordered districts, as will be seen by the following statement:

Number of deaths in worst localities,	.	.	.	5
of deaths in localities somewhat better,	.	.	.	5
of deaths in well ordered sections,	.	.	.	24

“In Lowell, Winter, Williams and Middle Streets, regarded as the filthiest in the city, there were no fatal cases. If one may deduce any conclusion from the mortality in Lowell in a single year, it would appear that though filth, putrid air and impure water are active agents in causing scrofulous, tubercular and bowel diseases, they have but little if any effect to cause typhoid fever.

“The greatest mortality from this disease is in August and October. The greatest number of deaths occurred between the ages of twenty and thirty. Recent residents seem to be most susceptible to attacks of typhoid fever. I have in mind instances where it seemed to extend itself by contagion.”

In a subsequent letter, our Lowell correspondent says: “You request me to give the population of the districts referred to in which the number of deaths from typhoid fever differed so greatly. It is difficult to estimate the number of persons living in these localities. Some streets are wholly good, bad, or indifferent in a sanitary point of view, while others may have two or even three of these conditions in different parts of their extent.

“The only convenient way that suggests itself to me is to divide the population into nationalities. Lowell has a population of about forty-two thousand. The Irish and those of Irish parentage number fifteen thousand strong, and there are three thousand French Canadians. The Americans and a small number of English, Scotch

and English Canadians constitute the remaining twenty-four thousand.

“Now the Irish and French Canadians, as a rule, crowd into the bad and indifferent localities, and almost wholly disregard hygienic laws. The Americans, on the other hand, as a rule, live in the well ordered sections and observe hygienic laws, but notwithstanding this, and also the fact that the mortality from all diseases for the year was forty-three more among the former than the latter, we find, what appears to me singular, that the mortality from typhoid fever among the Irish and French Canadians was only seven (five in the bad and two in the indifferent localities), while among the Americans it was twenty-seven (twenty-four in the good and three in the indifferent districts).”

In addition, we have the following history of typhoid in Lowell in 1870:—

“In reply to yours of the 6th ultimo requesting me to give the mortality in this city from *typhoid fever* during the year 1870 to the first of December, observing the same order regarding locality and nationality as that adopted in a communication respecting the same disease in 1869, I would say that I find the whole number of deaths from the disease to be 31; of this number 16 were in good, 4 in bad and 11 in indifferent localities or sections of the city. Among the American population (including the few English, Scotch and English Canadians) there were 15 deaths; 11 in good and 4 in indifferent locations. Among the Irish and French Canadian population and those of Irish and French Canadian parentage there were 16 deaths; 5 in good, 4 in bad, and 7 in indifferent locations. During the year 1870, to the first of December, there have been 879 deaths from all diseases and causes. Of this number 356 occurred among the American and 523 occurred among the Irish and French Canadian population, an excess among the latter over the former of 167 deaths. By the above statement it will be seen that typhoid fever has caused 4.21 per cent. of the deaths among the Americans and only 3.06 per cent. of the deaths among the Irish and French Canadians. Or to state it in another way, typhoid fever caused one death in every 23 deaths among the American and only one in 32 deaths among the Irish and French Canadian population.”

Lexington.—“I had eight or ten cases of typhoid fever in 1865 in a circle twenty rods in diameter. I noticed that within this area sinks disgorged their filth on the surface of the ground close to the houses, the privies had no vaults, the excrement lying on the sur-

face of the ground; a pigsty was an invariable appendage to each house or shanty, and often the house formed one side of the sty; the weather was unusually warm, and the stench horrid. At the same time a large piggery from twenty to forty rods distant was daily replenished and enriched by loads of slaughter-house offal. The air from it at times was almost insupportable. Sleeping and other rooms were small and badly ventilated."

Leyden.—Typhoid fever a rather prevalent disease. Our correspondent regards it as due to a specific poison in the atmosphere at certain seasons of the year, "coming we know whence," rather than to sanitary neglect. He has, however, frequently observed the disease to prevail where animal and vegetable matter was in a state of putrefaction, as near foul privies or over damp cellars holding decaying vegetables.

"In one family six persons had typhoid fever and three died. In this instance the privy was found to communicate with the well."

"The soil of the town, is, on the whole, rather dry than wet; surface uneven, and much exposed to north-west winds. Typhoid prevails more on the low than on the high ground."

Marshfield.—Our correspondent at Bridgewater writes as follows concerning a malignant form of fever which he witnessed at South Marshfield in 1842, and of which he thinks no account has ever been published:—

"In the spring or early part of the summer of 1842, Daniel Webster, who lived three miles from South Marshfield had a large surface of ground, in the vicinity of his homestead, covered with fish (some hundreds of cart-loads of menhaden), which were left to decompose during the warm weather. I was living in Hanover at that time, but was frequently called to the neighborhood in question. South Marshfield is in a hollow, bounded on the north-west, west and south-west by hills covered with forests which extend back several miles. In going from Hanover I passed through this forest and emerged from it on a high hill overlooking the village. From this hill I noticed a most offensive stench which continued several weeks. There was no unusual sickness in Mr. Webster's neighborhood, but in South Marshfield a very malignant form of typhoid fever began to prevail about the middle of July. Some of those attacked died in forty-eight hours without reaction. Many of those who lived a week had gangrenous spots, which sometimes became sloughing ulcers an inch in depth. A few recovered under the

influence of tonics and stimulants in very large amounts, but they made slow progress to health.

“In the latter part of August there prevailed a malignant form of erysipelas, with rapid and extensive sloughing of the skin.”

Our correspondent has no doubt that these diseases, appearing as they did to leeward (by prevailing wind) of the great accumulation of putrid fish, were due to this cause.

Martha's Vineyard.—Our information from this quarter is of an interesting character. The following remarks are from a medical man, a former resident of the island: “The eastern end of the island is sandy, chiefly drift. There are very few wells, and the people, in general, drink rain-water from cisterns. At the western end the land is high and hilly, and the water used is mostly from wells.” [The division of these sections is indicated in a pen-and-ink sketch enclosed by our correspondent by a line running nearly north and south through the middle of the township of Tisbury. The island of Martha's Vineyard is thus divided into two parts of about equal area.] “It is my opinion, gained from several years' residence, that cases of typhoid fever are as ten west of the line to one east of it.”

Our regular correspondent at Holmes' Hole writes as follows: “There is, without doubt, some influence or other which regulates the prevalence of typhoid fever upon this island, resulting in an almost complete absence of the disease in the eastern end, and confining it to the hilly part in the north and west. This latter region is almost all of it in the town of Chilmark. Now the population of Chilmark is to the rest of the county as one to four,* yet there is said, by the physicians who practise there, to be more typhoid there than in all the rest of the county. In the village of Holmes' Hole an epidemic of typhoid and dysentery occurred seven years ago, and all the fatal cases were on the same side of the same street. From all that I can learn, the conditions of the case are these: all the wells in the eastern part of the island are on the level of the sea. Those near the water's edge ebb and flow with the tide. In those further back this phenomenon is not observed, yet in these it is necessary to dig down to the sea-level in order to obtain water. As the land rises it is difficult to obtain water from the deep wells. This leads to the discontinuance of their use, especially in Holmes' Hole, where cisterns for rain-water are substituted. In Chilmark, the hilly region, spring water and well-water are almost universally used. The wells are on a higher level than the sea, caused no

* One to six, according to Census of 1865.—Sko'r.

doubt by the clayey substratum which forms basins for the collection of the water. On the side of the street referred to in Holmes' Hole, where typhoid and dysentery prevailed, every fatal case was in houses supplied with wells. No cases, fatal or otherwise, occurred in houses provided with cisterns, the water of which was used for drinking purposes. The only case of typhoid I have known since I have been in practice in this village was imported."

Our correspondent in West Tisbury practises also in Chilmark, the adjoining town, and may speak for the western end of the island. He says: "Probably more cases of typhoid occur in the town of Chilmark than in all the rest of the county." [This fully confirms the opinion above given by a former resident of the island.] "I have imputed this to the character of the subsoil, which is clay, retaining the moisture, and also to the greater fertility of the soil. Typhoid is comparatively rare in the eastern part of the island, where the soil is light and sandy and the vegetation sparse.

"In several instances I have known typhoid to follow the taking down and repairing of old houses while the family still lived in a part of them; but in a majority of cases I have been unable to assign any cause. The inhabitants in the region of my practice use either well or spring water,—generally the former. Occasionally a family will use cistern water in winter. I have never observed any connection between typhoid and foul air from decaying animal matter, as fish spread on the land for manure, but I have thought the disease prevailed more extensively where vegetation grew luxuriantly and where large amounts were left on the ground, in the fall, to decay."

[The condition of the camp-grounds at Martha's Vineyard in the summer of 1869 was such as would lead an observer to predict that sooner or later they would be visited by pestilence. They certainly violate the plainest teachings of hygienic common sense. The buildings are so close together that ventilation is obstructed; they have no drainage; there is no adequate provision for the removal of refuse; the privies and wells are everywhere in close proximity, and most of the houses are so shaded by trees that direct sunlight can hardly ever reach them.—SECRETARY.]

Mendon.—Our correspondent, who has practised in this town during the past forty-four years, reports that during that period he has not met, in the usual circle of his visits, with more than (by estimation) one hundred cases of typhoid fever. "Many years ago, during the autumn, all the members of a family, six in number, had typhoid fever, mostly of a mild type. Three or four other families,

within sixty feet of the first, did not have a single case. The family in which the cases occurred was remarkably neat, and from garret to cellar everything, in a sanitary point of view, was well cared for. In the autumn of 1836, while the only physician in Milford was sick, I had the care of some thirty cases of typhoid in that town. I attributed its prevalence at that time to the fact that a large, shallow pond which had for a long time been covered with water was, during that year, bare. The Milford cases were all confined to the valley in which the pond was located, and no cases occurred beyond the summit level on each side of it, east and west (the stream running south)."

Medway.—"There is a large swamp near the centre of the town, but the land around it is generally somewhat elevated, and but few people live near its level; those who do I think are more subject to fevers. We have had no general epidemic of typhoid since 1839. At that time the most severe and fatal cases were observed to be in houses with bad drainage and exposed to the influence of decaying animal and vegetable matter."

Montague.—"Typhoid fever occurs where the surface water has drained off or dried up, leaving vegetable matter, which at other times is covered, exposed to sun and air. My observation leads me to believe there is a close connection between this disease and foul soil and putrid air. It prevails more in the lowlands about swamps and stagnant water than in the upland."

Middleton.—"Thirty years' practice. Typhoid a rare disease. When it has appeared, it has been by single cases, without any apparent cause. If the greatest care was not given to ventilation, it has spread by contagion."

New Marlborough.—"I have no doubt that foul soil from privies and pigsties is often connected with the development of typhoid fever, although I have not met with such cases. I have observed instances in which I thought the disease was due to rotting vegetables in cellars, and to old cisterns with stagnant water, and I make it a point when I have cases of typhoid to look out for these causes of impurity, and to remove them when they exist."

Newburyport.—"Water supplied from neighborhood wells. A pump on the highway affords water for twenty or thirty families. Some old estates have wells on the premises. No connection

observed between this water supply and fever. During the war, have seen typhoid originate in camps from unventilated quarters and decomposing vegetable matter."

Nantucket.—Our correspondent recalls two cases of typhoid in one house some years ago which were apparently caused by a mass of turnips which had been left in the cellar and forgotten until their presence was made known by the smell of decomposition.

Northbridge.—The disease not a common one here; but the old village of Northbridge Centre, situated upon a hill, is thought to have comparatively more cases than the factory village, situated on a stream and in a valley.

Newton Centre.—Typhoid is rare here. "In ten years I have seen not more than twelve cases, and two-thirds of these occurred among the theological students, on the top of a very high hill, where the subsoil is *tough marl*; the other four were at the base of the same hill, where the soil was swampy and the house-sills decayed. Improvement in two of these cases was very marked, after removal to higher and drier land; two other cases were fatal. The village lies on a plateau, one hundred and fifty feet above Charles River; has most excellent surface drainage, and is *underlaid with an unfathomed bed of loose gravel.*"

Orleans.—"Typhoid fever was first known in this town and vicinity in the spring and summer of 1837. It was then epidemic and severe, and pervaded the whole town. I could never trace the cause to bad drinking-water, decomposing matter about the premises, bad ventilation or any local filthiness; but in my opinion, the atmosphere of the whole place had become contaminated, tainted, *poisoned* by the noxious exhalations from low, marshy grounds surrounding the numerous inlets from the sea (forming ponds of mingled fresh and salt water of greater or less extent) with which this town is sadly cut up. Typhoid fever has stuck to us ever since 1837 in the summer and autumn, but most prevalent and most severe in dry seasons. The towns on the south side of the Cape were comparatively exempt from fever at the time it first appeared in Orleans, and for several subsequent years; but of late, sporadic cases are quite common. The town of Chatham is geographically very like the town of Orleans, but there are counteracting climatic influences."

Oxford.—Opinions based upon a practice of forty years.

Our correspondent says: "I have very frequently observed a

marked connection between typhoid fever and exhalations from privies, cess-pools, pigsties, foul cellars, &c. These, together with filthy and unventilated places of living and sleeping, have appeared to me to be the cause of typhoid fever in a great majority of cases. So firm is my belief of this that when I meet with a case of this fever not readily traceable to some of these causes, I infer that the truth has not been told me, or that my perceptive faculties have been at fault."

Pittsfield.—Has good reason to believe in the production of typhoid fever by local causes. In the summer of 1864 this disease appeared among the pupils of the Maplewood Institute. Among seventy-seven young ladies occupying the premises, fifty-one were attacked, and thirteen died. Three servants also died. A thorough investigation of the causes of this pestilence was made by three professors of the Berkshire Medical College, whose report was published. The water used at the school was brought by an aqueduct from hills outside the town, and was of unquestionable purity. During a few days in July this water gave out, and the supply was from a well in the neighborhood used by several families, none of whom suffered from illness. There seems to have been no well on the premises. The committee were of opinion that water had nothing to do with the disease. A few rods from the school was a barn, whose yard was a basin holding foul water, in which swine wallowed, emitting an offensive odor. The kitchen drain discharged its contents on the surface of the ground. The vaults of the privies were shallow, filled to overflowing, and emitted an odor very offensive, and at times pervading the whole building. The grounds were excessively shaded by trees, and the sleeping-rooms were so shaded by piazzas and vines that the direct rays of the sun could not reach them. These were the causes of the fever. At the same period there was no unusual sickness in Pittsfield, and since the removal of the causes above described, the Maplewood Institute has been exempt.

In December, 1835, typhoid fever appeared in Pittsfield in a family of about forty persons, a boarding-school for boys. The head of the school and four boys died. Eight or ten other cases recovered. The surrounding community was healthy. In this family the water used was from a well under the wash-room. The drain from the wash-room was obstructed, and the foul water found its way under the floor and into the shallow well. The well was closed, and the family supplied with water from another source, and the fever subsided.

The published report of the board of health of the town of Pittsfield for the last year shows the most intelligent interest in the prevention of disease, and the citizens of that town may be congratulated on having such faithful guardians of the public health in the gentlemen who constitute the board.

Since the above was written, our venerable correspondent at Pittsfield has been removed by death. The town authorities have promptly appointed a successor, who writes to us concerning typhoid in 1870. "A case of typhoid fever under my care in September appeared to be caused as follows: The man was engaged in laying drain-tiles in a meadow, with two others. They all drank while at work from an old well in the meadow, supplied only by meadow water. This case of fever was severe, but recovery followed. It so happened that the other two men engaged in the same work, both came to me, one a few days before, and the other a few days after the case of fever occurred, with violent headache, general pains, and nausea. Both immediately recovered after a vigorous catharsis, followed with quinine; but I attributed their symptoms to the poison of the meadow well.

"Another physician of Pittsfield reported to the Medical Society in September two cases of typhoid occurring in the immediate neighborhood of an overflowing and very foul cesspool from an hotel. The same physician also reported in August a case of typhoid in a very old house, under which a cellar was being dug, disturbing a great quantity of rotten timber.

"Another physician of Pittsfield, had three cases of typhoid in July, in a house built upon a meadow, through which, and near the house, flows a sluggish brook, which receives all the sewage of the town. This house is also surrounded on three sides by stagnant ditches, foul with sewage. Most of my own cases have been of obscure origin."

Our correspondent states that typhoid has been unusually infrequent in Pittsfield during the past summer, and adds: "I am quite sure, and it is the general impression here, that our comparative freedom from fevers during the past summer, has been largely due to the activity of the town board of health, in causing the immediate removal of every removable nuisance or source of sickness. Our board of health has now acquired so established a character that our 'notices' have been immediately complied with. In only two cases has it been necessary to remove a nuisance and collect charges of the owner."

Provincetown.—"In a practice here of more than thirty years,

typhoid has been a rare disease; never epidemic. I have had sporadic cases which were aggravated by ill-ventilated rooms. •

“Our wells rise and fall with the tide at all seasons, and afford very pure water.”

The following letter was received from Provincetown in December, 1870, in reply to a question whether putrid fish had ever been known to cause typhoid fever in that town:—“I came to Provincetown in December, 1839. During that year typhoid fever (as it was called) had prevailed epidemically, and was very mortal. It had subsided so that I did not see any of the cases. During the winter much was said about the offal of fish, left on the shores unburied, as the cause of the fever of the preceding season. At the town meeting in February, a very efficient man was chosen as health officer, who kept the shores clear the following year, and there were but few cases of typhoid. The shores have been kept clean from that time to the present, and typhoid has diminished. For fifteen years past typhoid fever has been almost unknown among us. Now and then a sporadic case occurs; whether this is owing to our keeping the shores clean, or to the inhabitants taking better care of themselves, the fact is that typhoid is so rare with us that we do not look for it unless it is imported, while Truro, Wellfleet, Eastham, Orleans, Chatham, are not so exempt. We shall keep our shores free from filth for general convenience, and if by so doing we keep off disease, we are by so much the gainers. We have swamps which have been in a great degree converted into cranberry bogs, by being filled up with sand, and this I think, has had some influence in making this a healthy spot. I should say that in the towns above referred to, typhoid fever cannot be referred to decaying fish left on the shore, for they are not exposed to this danger as we are. I still believe that decaying vegetable matter and impure water have more to do with the production of typhoid.”

Pembroke.—“Some of the most severe and fatal epidemics of typhoid dysentery I have seen occurred in very dry seasons, in the vicinity of large ponds, or low marshy places usually overflowed, but then exposed by prolonged drought.”

Rowe.—Our correspondent has had an experience of thirty-eight years' practice of medicine in this town, and answers our first and third questions in the negative.

Typhoid has seldom originated here, but has often been imported. “In one instance we had an endemic fever, arising from the flowing of an artificial pond. It did not seem to be pure typhoid, so I

called it the 'pond-fever.' All the cases recovered. Some years ago a case of typhoid was imported into the neighboring town of Monroe, from a region where fever was prevalent. It was communicated to the attendants and visitors, and was of a severe type, causing many deaths. It was a strictly contagious disease.

"On another occasion, in a high and healthy part of the town, a family of four persons came down with the fever. They were neat and tidy people, but I always thought in this case there must have been some impurity about the premises. All recovered."

Randolph.—"Typhoid usually occurs among us from August to November inclusive. Occasional cases occur during an open winter, or in the following spring. Its time of prevalence generally coincides with the season of low water, but it ceases for the most part with the coming of dry, cool weather, whether the autumn rains have been heavy or light."

Rutland.—"Although I have uniformly tried to discover the connection between cases of typhoid fever and its alleged causes, my experience has been negative rather than positive. There are several neighborhoods in the region of my practice the atmosphere of which in the warm season is often rendered very offensive by the offal and pigsties of slaughter-houses, and the draining off of two or three large reservoir ponds used for the storage of water for factories. This has been especially true this season, but typhoid fever has never prevailed in these localities more than in others; and never at those particular times and places when and where they would naturally be predicted.

"For many years after my first residence in this town (1839), probably a dozen, I never saw a case of typhoid fever on the summit of the hill on which the centre village is located, unless it was imported. A very few since that time have originated there. The hill is of about eleven hundred feet elevation above tide-water, and has no wet subsoil. In digging wells which are the only supply for water, a ledge is always encountered, at a depth of eight, ten or twelve feet. The base of this hill has not had the same immunity from this disease. About a mile to the north of this hill is another of about the same height, on the summit of which there have been, until within a few years, two families. In both of these houses typhoid fever used to be of very frequent occurrence. In one of them, which was burned down six or eight years ago, it was rare that a hired man or a female domestic escaped the disease the first autumn. I never could quite satisfactorily explain the prevalence

of typhoid on one of these hills, and the comparative immunity of the other, unless it was because one was wet soil and the other dry."

Rockport.—"Although dysentery and typhoid fever are seldom absent during the latter part of summer and the fall, they have only once presented a sufficient number of cases to warrant being called 'epidemic.'

"While the typhoid epidemic was prevailing there appeared to be nothing unusual in the state of the atmosphere; but during the epidemic of dysentery, the weather was unusually hot and dry, many of the wells were dry, and rain was withheld until far into October. In neither instance could the disease be traced directly to any decomposition of animal or vegetable matter, but in both seemed to spread from communication with the sick. Within a few years, however, I have noted cases of typhoid which seemed to be connected, in one instance with vegetable, and in another with animal decomposition. In December, 1868, I was called to see two cases of typhoid in a room underneath which was stored a large quantity of turnips and cabbages which were rotting, and the odor from which was extremely unpleasant. Soon after two other cases occurred in another family in the room immediately over the first, while in the opposite end of the house, also occupied by two families, but not directly over the vegetables, no case occurred. There was but one other case in the neighborhood about that time, and that was in the house adjoining. During the hot and dry weather in the latter part of the summer of 1869, some fifteen cases occurred in quick succession in tenement houses owned by the 'Rockport Granite Company.' Most of them were under my care. These houses were situated on a high and broad ledge, with very little soil on its surface,* to absorb the semi-liquid contents of a half dozen privies and pig-pens which flowed out over its north-east declination towards the sea. The stench was almost intolerable. On my representing to the clerk of the company the possible effect of such a state of things, the premises were freely strewed with quicklime, and subsequently covered with dry coal ashes. The adoption of this modification of the dry earth system was soon after followed by copious rains, which washed the surface of the ledge and carried into the sea much of the filth which had accumulated during the summer. No new cases occurred, and I am led to believe the means used, along with the atmospheric changes prevented the spread of a serious disease."

* Compare with remarks of Worcester correspondent on "ledges."—SEC'Y.

Reading.—"Three years ago there prevailed here an epidemic of typhoid dysentery, beginning in the middle of August, and lasting about six weeks. There were eighteen deaths. One, a young girl, was living in a high, dry, healthy spot, a half mile from the rest. All the others were in or near a circumscribed locality, low, level, wet; the ditches full and overflowing, the wells also, and some of the latter I know were offensive. The season was unusually wet. The rest of the town, and the adjoining towns were remarkably healthy."

Rochester.—"Forty years ago typhoid prevailed extensively in this town. I was then in practice, but I cannot from memory throw any light on the causes. A few years since I knew a whole family sick of typhus from a very foul cellar. One died."

Sutton.—In illustration of the effects of drinking-water made foul by decomposing organic matter, the following instructive facts are related by our correspondent:—

"A large house in this village is supplied with water from a well in the front yard, three rods from the house. Connected with the house is a barn without cellar, some three rods from the well. In December, 1868, a trench three or four feet deep was dug from the well to a point near the middle of the barn, where a pump was set and a pipe connecting it with the well was laid in the trench; after which the earth, which was in large frozen chunks, was filled back into the trench. In the house was kept a boarding-school for boys, of whom there were ten or twelve. Three little girls were also there, aged twelve, eight, and three years, belonging to the family of the owner of the house; there were therefore fourteen or fifteen children who drank from the well. The oldest boy was seventeen or eighteen years old, while the others were of ages from ten to thirteen.

"Everything went well until after the thaws in February and March, 1869, when the water had a decided taste and smell of stable-manure. March 26th, one of the boys, thirteen years old, was seized with typhoid fever; another, twelve years old, on the 31st of March; another, eleven years old, April 2d; another, ten years old, April 4th, and another, twelve years old, April 9th. April 20th, one of the little girls (eight years old) was seized. Each of these six children (all of whom finally recovered) drank water with their meals from the well in the yard. Some of the older boys drank coffee in the morning and tea at night. The manner in which these children were attacked, and the fact that this

house had been free from typhoid fever for many years, and the water heretofore known to be very pure and wholesome, leads me to the conclusion that the use of the water thus impregnated was the cause of the disease occurring where and just at the time it did. My theory is that while the ground, manure, &c., under the barn, were frozen, the water was all right; but when it thawed, and the previously frozen filth leached through the soft and loose earth along the track of the pipe into the well, the effect of the poison was felt most perceptibly by those who used the polluted water most freely, while those who used it less freely escaped entirely."

Salem.—"In one season, typhoid fever prevailed extensively along the banks of the North River, but of late years it has shown no more preference for that locality than for other parts of the city. Cases seem to be quite equally distributed about the city, without regard to soil or water supply, whether from wells or aqueduct.

"It has been a matter of surprise that the old mill-pond has not been a more fruitful source of disease than it has hitherto been, as its surface is covered, during the hot season, with decaying vegetable matter."

Somerset.—Our correspondent thinks that the influences of marshes, and not those referred to in questions 3 and 4, are concerned in the cause of typhoid fever.

Shelburne.—Our correspondent reports twenty cases of typhoid, of a severe type, which occurred in 1868, in a little hamlet of eight houses at the confluence of the North and Deerfield Rivers. With one exception these houses were clean, of rather recent construction, and free from any discoverable cause for the disease.

Shirley.—"I give you the history of typhoid fever as it has occurred in a certain house in this town; not as throwing light on the questions you have submitted, but from the regularity of the intervals being very peculiar.

"1st. In 1818, when four deaths occurred.

"2d. In 1836, three cases and one death.

"3d. In 1856, six cases and three deaths.

"On neither of these occasions was the disease specially prevalent in this vicinity. The house is in a valley on a small, sluggish stream, a tributary of the Nashua River. No other local cause was ever recognized. The commencement of the disease each year was in August."

Somerville.—The most severe epidemic known here in fifteen years occurred in July and August, in a section of the town sloping to the south, with decidedly dry soil and with good well-water. "I regard bad air as one of the principal causes of this disease. The most unhealthy condition we ever experience is to live in a house with a wet and imperfectly drained basement. Large and well-ventilated sleeping-rooms are indispensable to health, and equally so for the recovery of the sick."

Shrewsbury.—"I have observed for some years an apparent connection between foul soil (and consequently air) and typhoid fever. I have often believed a vile sink-drain, or rather sink-pool, to be the cause; also, butchers' slaughter-yards, the foul effluvia from which have seemed to favor typhoid and dysentery of a low grade."

Spencer.—"Have observed instances where typhoid fever seemed to be directly caused by foul air from pigsties and privies. Five cases at an isolated farm-house, in 1867, apparently due to the foul air from a pigsty. The disease more prevalent in houses supplied with water from wells."

Stockbridge.—"A few years since there were several tanneries on the river just above us, from which tons of filth were cast into the stream to be borne away or scattered over the low lands, as chance or flood might direct. The result was a dreadful stench and a prevalence of typhoid fever, causing numerous deaths. The tanneries were finally removed, and water introduced from a neighboring hill through iron pipes; and, with a purer air and delightful water, typhoid fever has almost become unknown. Nearly all the people used wells formerly, while we now have a fine reservoir."

Stow.—[See remarks on diseases most prevalent in towns.]

Southampton.—"Have observed typhoid fever to prevail with great severity in a neighborhood where a mill-pond had been drawn off, leaving the debris at its bottom exposed to a hot sun, generating putrid air."

Stoneham.—"I think there is a connection, and an intimate one too, between typhoid fever and foul soil. Several cases could be distinctly traced to this source, in the form of filthy privies and pigsties."

Springfield.—"In three-fourths of the cases of typhoid fever

coming under my observation, in this city, during the past eight years, *foul soil* from privies or defective drains was present, and in, I should say, one-third of the cases impure privies were on the premises. Most of my cases of typhoid have been found in ill-ventilated apartments and overcrowded tenement-houses. In a large number, I could trace the cause directly to impure air from decomposing animal matter. In several families where it prevailed the cellar was inundated with sink-drain water.

“Since the more general introduction of water from springs, by the Springfield Aqueduct Company, there has been a diminution in deaths from typhoid. Of late the drainage has also been better. There has been no epidemic of typhoid during the eight years of my observation; but the cases have been sporadic, springing up here and there wherever some focus of infection has seemed to be produced by decomposition.”

Sunderland.—“Typhoid fever has only once prevailed here as an epidemic during the past twenty years. It was then (1851) as I doubt not, due to imperfect drainage. The season was very dry and hot. I then called the attention of the town to what I regarded as the cause. The drains were opened and have since been kept open.”

Our correspondent in reply to the third question of the typhoid circular says: “In several instances, the connection has been of such a nature as not to admit of a reasonable doubt. In one case a whole family was down from the influence of a neglected cistern.”

Sterling.—Our correspondent reports that typhoid has prevailed in this town and vicinity to an alarming extent during some past seasons but not within the period of his own observations.

Swampscott.—Three cases of typhoid are reported as occurring at about the same time, and among the crew of the same schooner. They had been exposed on board to the emanations from a quantity of putrid clams which were very offensive.

Taunton.—“The disease has been observed to be prolonged and convalescence made tedious when sinks and cess-pools and cellars were neglected.

“It is not unusual to meet with cases of typhoid in boarding-houses of unskilled laborers. In such cases I have sometimes found them in an attic room with three beds, two men for each bed, one window in the room and the upper sash fixed.”

Truro.—"There has been a good deal of typhoid fever here the last year, and I have observed that nearly all the cases have been around a low, marshy meadow over which the tide used to ebb and flow, but from which the salt water has been excluded of late by a dike built about a year ago."

Tewksbury.—Our correspondent states that some years ago, while he was in charge of the Monson State Almshouse, typhoid broke out in a detached building occupied by idiotic and epileptic patients, and was arrested by clearing it out, and having it thoroughly cleansed. Typhoid rare in Tewksbury, either inside or outside the State Almshouse.

Upton.—"I think I have observed a connection between typhoid symptoms in fever and other diseases, and foul air and soil from want of proper drainage, unventilated sleeping-rooms, and decomposing substances in and about the houses; and where these conditions of impurity were most obvious typhoid was most severe."

Uxbridge.—Several cases in one house apparently proceeding from filth spread upon the ground from a sink-drain. No new cases after removal of cause.

Webster.—Our correspondent believes that putrid air about houses is a prolific cause of typhoid. "During an epidemic of typhoid fever in 1864 I met with about forty cases in three tenement houses. The houses were one story, with basement tenements, and cellars only in the rear of the basement. All the fever cases occurred in the upper tenements during the summer and autumn. Not a case occurred in the basements until late in winter, and then only two or three mild cases. I attributed this to the exhalations from the cellars and sink-drains having free access to the rooms above, but not to the rooms below."

Ware.—Our correspondent has not been able to plainly trace the origin of fever, in the cases under his observation, to the causes enumerated in questions 3 and 4, except in a young man who had typhoid after cleaning a dirty cellar. While engaged in the work he complained of its making him feel sick, and two weeks after came down with severe typhoid fever.

Instances of apparent contagion from one case to another have been observed.

Westfield.—"Have had a great many cases which could be directly traced to decaying vegetable matter coupled with moisture, in cellars and about houses."

Warren.—"In two instances have thought there was a connection between the disease as it appeared and ill-ventilated cellars."

Winthrop.—"One section of this town is, from some cause entirely unknown, very subject to typhoid fever. In one house, built ten or twelve years ago, there have been at different times fourteen cases. Local causes have been often sought for but never found. The situation of this portion of the town is high, and very much exposed to wind. The soil is rather springy and cellars often damp."

Wrentham.—"Typhoid fever not by any means a prevailing disease. Twelve cases under observation of our correspondent last September. "In each place where it occurred, the water used by the family was of questionable purity, privies or sink-drains being very near the well. In one instance a direct communication between an obstructed sink-drain and the well was shown to exist." Our correspondent has met with no case of typhoid in families supplied with water from springs or ponds; and in a subsequent letter informs us that he can recollect twenty-four families so supplied; and that there are doubtless others. In some of these families, water is obtained by dipping directly from the spring."

"Little attention is paid to the condition of cellars. Drains and privies are often too near wells. Hence typhoid and dysentery."

West Boylston.—" [See remarks on diseases most prevalent in towns.] "

Westborough.—"Our correspondent believes that he has often seen a connection between typhoid fever and foul soil and air, but limits the connection to cases in which the decomposing matter was under cover, as from cellars, or from drains which had become obstructed and thus thrown their contents back to the cellar or under the dwelling. He is also suspicious of the influence of shade-trees in close proximity to the house."

West Newbury.—"We have had no epidemics of typhoid or typhus for the past ten years,—a few cases arising from local causes. We have had, however, two epidemics of dysentery, ascribable to local exciting causes in connection with continued hot, dry weather. These causes were bad sink-drainage, filthy cess-pools and slaughter-

houses not properly disinfected, the waste being matter thrown into pig-pens to be partially eaten by pigs, and the rest to become decomposed, and render the air impure and noxious for quite a distance from them."

Wales.—"In years past have observed the connection between typhoid fever and foul soil and putrid air from dirty cellars and un-ventilated sleeping-rooms."

Watertown.—"In connection with inquiries 3 and 4, I will say that in all instances in which I have seen a succession of cases of typhoid fever in one house or in a small locality, I have diligently searched for some local cause of contamination, but have never, with a single exception, been able to discover any satisfactory one."

The "Boston Medical and Surgical Journal" for February 4, 1869, gives a history of some cases of fever originating in Watertown, which are doubtless the exception to which our correspondent refers. Five members of a family were successively attacked with typhoid fever in the autumn of 1868. A foul smell had been perceived soon after the first case occurred, and the drain was taken up and examined, *but nothing wrong was discovered*. Some weeks later, a *more careful* search being made, it was found that an opening existed between the drain and an air-box which conveyed air from without to a chamber behind the kitchen range, and thence to the bath-room and other parts of the house. *A third search* being made still later in the season, another opening was discovered beneath the wash-room floor. The workman who took up the floor was so overpowered by the effluvia that he had to be assisted to the outer air.

Winchester.—"I had last fall two fatal cases of typhoid in the same house, where the water came from a cistern exposed to contamination from a leaky sink-drain. At the same time the vault was overflowing, though not in a position to make it probable that its wash affected the cistern. They died of distinct blood-poisoning, but the other members of this family were not attacked with typhoid, although one was threatened with it.

"There is a tenement house in this town occupied by seven or eight Irish families, where for the past three years the sink-drains emptied into the cellar, whither also the wash of the privy worked after every rain. The well is in this cellar. Now I have known but one case of typhoid in that house. There have been several cases of diphtheria, two or three of which were fatal. I have made

various efforts to get the drains in this house put in order, but can effect nothing. It amazes me that there is not more severe sickness there, but it stands at a distance from any other house, and the children live out of doors, while awake."

Walpole.—"Typhoid fever not often met with. There is, however, one house in which it has occurred, in 1856 and 1858. It is situated on the north side and at the foot of a high hill, and is surrounded from the south to the north-west by low, swampy land.

"Some years ago, an epidemic of typhoid and dysentery occurred among the residents near a mill-pond which had been drained for the purpose of making repairs. Typhoid has more frequently occurred in the south part of this town (where there is low, damp land bordering a stream), than in any other part."

Waltham.—"A brook in this town flows about six months of the year; at other times there is only a ditch of stagnant water. It is just back of an Irish settlement. Typhoid usually commences here, and is more prevalent and more severe than in any other part of the town."

Williamstown.—Our correspondent reports an outbreak of typhoid of a severe type in August, 1868, in tenement houses on the grounds of the Williamstown Manufacturing Company. These houses (eighteen in all) are in two rows, placed back to back, with a space of thirty-three paces between them. In this street or passage, common to them all, are placed the privies; there is also a gutter which makes pretence of carrying away the water, but fails of doing it. Close by the front of the row, facing south, is a well; at this well washing was done, and when the sickness broke out the water was falling. The well had a pump and a platform about six feet square. At one side the water had worn a hole, and it is probable that the foul water from washing was drained from this hole into the well.

"About twenty cases of fever, with several deaths, occurred in the tenement houses using this particular well, and it was in the section of the tenement houses, of both rows before referred to, nearest this well that the outbreak occurred. Typhoid fever did not exist in other parts of the village at the time."

Westminster.—"A large proportion of the cases of typhoid fever observed here, have occurred in persons living in the valleys, or in persons who have been at work in low lands, getting

swamp hay. There are several places in the town where the land is flowed early in the season, and then the water drained off to allow a crop of grass to grow. I have attributed typhoid and dysentery, in part at least, to the exhalations arising from these places."

"Typhoid-dysentery prevailed last year in a particular locality. Five houses containing ten adults and fifteen children were affected, and not an individual escaped the influence in a greater or less degree. The cause was evidently the exposure to the sun's rays of the bottom of the pond. The prevailing winds were from the pond to the houses in question; houses still nearer the pond, but to windward of it, escaped entirely. After rain had fallen to fill the pond again the sickness disappeared."

Wilbraham.—"We have had an epidemic of typhoid among a few families living within a third of a mile of each other on the same road. Only one, or at most two in each family escaped its influence. The soil is wet, retaining water a long time; somewhat elevated, yet near the highway is a swamp, from which arises quite a stream of water. At one of the houses I learned that the sink-drain was broken, and that an unpleasant odor arose from it. From others the sink water was allowed to flow over the surface of the ground. The families are all in good circumstances, not exposed to want, or given to luxuries."

West Roxbury.—Typhoid fever rarely seen. In cases which have occurred, no satisfactory cause could be discovered.

Worcester.—Our correspondent has collected the opinions of several leading practitioners in his city.

One says: "Typhoid is a comparatively rare disease among us. It has occurred, however, in all parts of the city; quite as often in high, airy, well-ventilated houses, as the reverse. I have never been able satisfactorily to trace the disease to any particular cause."

Another expresses essentially the same views, and adds: "I have often remarked the strong predisposition to the disease in certain families."

Another says: "The worst cases have been on high ground, and under apparently the best hygienic influences."

Another believes that foul soil and foul air are causes of typhoid.

Another says: "When I first came to Worcester there was a row of privies in Maple Street, which drained into the wells near by, and typhoid fever raged until the use of the water was discontinued. I have found more of the disease on hills where, under

the soil, was a *ledge*. My opinion always has been that, in such places, the water became retained in cavities in the rocks under the soil, and was the cause of the disease."

Another says: "I think we have had less typhoid in Worcester since the introduction of 'city water.' When the disease raged so fearfully in Auburn a few years since, the wells were dry and the ponds very low. I thought that perhaps there might have been miasma from the ponds as a cause, but those living around those ponds were free from the disease. It occurred almost entirely on the hills. I have always thought that its increase was from contagion."

Yarmouth.—Our correspondent regards true "dothineritis" as one of the exanthemata or eruptive fevers; not influenced by the conditions enumerated in questions 3 and 4.

SHAKER COMMUNITIES.

We have endeavored in various ways to obtain definite information concerning typhoid fever among the Shakers in Massachusetts. Their habits of extreme neatness render them in this respect an exceptional people, and their experience, if it could be obtained, would be of great value. Our efforts have been only partially successful. The following is all we have been able to gather from reliable sources.

The *Lebanon Community* (just over the State line) numbers 400, of whom one-fourth are under eighteen, and there are none under five years of age. During the past year two cases of typhoid have occurred among them; one of these is said to have been contracted elsewhere. Twelve years ago, a woman employed in the dairy died from a violent form of typhoid, at a time when the dairy drain was obstructed. Since that time the drainage has been made very perfect, and fevers have been infrequent. The Shaker village is more elevated than the village of Lebanon, where typhoid is frequent. Epidemics of fever have sometimes visited the Shakers, having been severe in former years when drainage was bad. Epidemics of typhoid in the Shaker village, and in the village of Lebanon, have never been known to coexist; but sometimes when it has subsided in the one, it has immediately broken out in the other.

The *Hancock Community* numbers 150, of whom 25 are under eighteen, and none under 5 years of age. Their phy-

sician has been connected with the community for 43 years, and states that he has no recollection of a case of typhoid fever among them, although bilious and gastric fevers are not uncommon. [Physicians will see from this statement that it is a question of diagnosis.] He also states that since the partial drainage of Richmond Pond, which is less than a mile from the Shaker village, sickness in their community has increased.

It will be evident from all this, that the statements which have been sometimes made by tourists and sensational writers, that typhoid is an unknown disease among the Shakers, are incorrect.

Such is the evidence we have been able to collect concerning the causes of typhoid fever in Massachusetts. The more difficult task still remains of endeavouring to draw from it some consistent and reasonable conclusions. Let us try to find some continuous thread of probability, if not of proof, by following which a clearer idea of the relation of cause and effect may be finally reached.

There are some essential facts which do not appear in the evidence presented. First, as regards the season in which typhoid prevails.

The registration of deaths shows that it is a disease most rife in the months of autumn and early winter, but that no season is exempt. The observations of physicians would show that, when prevailing epidemically, it is found to begin usually in the months of autumn, and to continue till December, but rarely later. Individual cases (sporadic) are met with in every month.

During the five years 1865-1869, deaths are distributed among the months in the following order:—

*Deaths from typhoid fever in Massachusetts arranged by months.
Five years, 1865-1869.*

January,	363	July,	332
February,	316	August,	596
March,	338	September,	814
April,	301	October,	973
May,	318	November,	754
June,	249	December,	493

It is to be remembered that the origin of the disease must be transferred to the month preceding that in which death occurred.

We may say then that while typhoid occurs in every month of the year, the causes, whatever they are, which produce it are in greatest activity in August, September and October.

The liability of the sexes seems to be equal.

Age is an element of more importance. The registration returns are not to be depended on to determine its prevalence in infancy, since custom has permitted deaths from infantile fever (whatever that may be) to be incorporated with typhoid. It is well known and will be generally admitted that while rare, the disease does occur in infancy, and also at advanced age. It is, however, specially a disease of adolescence and early maturity, the maximum of deaths in any decade appearing between the ages of twenty and thirty.

Before attempting to examine the alleged causes of typhoid fever in Massachusetts, let us first see what has been the prevailing belief on this subject.

The late Dr. Nathan Smith, of Hanover, N. H., whose opinions upon all medical questions have had great weight in New England, is one of the few writers of preceding generations who have examined the causes of this disease. His observations were made, for the most part, on cases which he had seen along the Connecticut River, from Hanover to Middletown, during the years between 1787 and 1821. He believed typhoid fever to be propagated by contagion, and gives many examples in proof; also that, like other contagious diseases, it rarely affects the same person twice. Dr. Smith says:—

“I have not observed that situation has any influence either in producing or preventing this disease. It affects alike persons living on mountains and in villages, on plains and the banks of rivers, and on the borders of lakes and stagnant ponds. And I have not perceived that occupation or habits of life make any difference in their liability to receive this disease, nor has it in this country been confined to the poor and filthy; but affects nearly alike the rich, the poor and middle classes. * * * * It seems to possess a migratory character, and travels from place to place, and after remaining in one village for a longer or shorter time, as from one year to two or three, it ceases, and appears in another. * * * * The fact of the absence of typhus in a large section of country for an interval of

more than twenty years would lead us to doubt the possibility of its being produced by accidental causes; for in such an extent, and among so many people, it is impossible but that some of these circumstances should have occurred, and the disease of course be produced. Besides, if it can be communicated from one person to another, it has a specific cause, and I know no disease that arises from a specific cause that can be produced without the agency of that cause."

Dr. Smith's views with regard to contagion have certainly not been universally, perhaps not generally, received, but what he says about the migratory character of fever, and its disposition to attack all classes of persons without regard to location or habits of life, has, until recently, been generally believed by the medical profession in New England ever since his time. It is doubtless the present opinion of a large number of our correspondents who have replied briefly to our questions, and among them are some of the most intelligent observers of disease among us. This view is expressed by our correspondent at Cambridge unreservedly, and by many others with certain qualifications. Our correspondent at Leyden says that at certain seasons "it comes, and we know not whence."

But the disposition to pry into all the secrets of nature which marks the present period, and in which the medical profession has been foremost, has led to more careful inquiry and comparison with regard to the whole tribe of epidemics. Men of research and of great ability have probed the history of the epidemics of the middle ages and have made it appear more than probable that their virulence, if not their origin, was due to the filthy habits of the people. Special epidemics among the inferior animals have been studied with great success during the past twenty years and their causes shown. (See Parliamentary Reports on Cattle Plague; also Pasteur's investigation of the cause of "Pebrine" in the silk-worm.) Diseases of men previously quite as obscure in their causes as typhoid fever is to-day have been made plain and intelligible. (See modern investigations of Trichina disease in Germany and England, and the report on Charbon by Dr. Nichols in the present volume.)

The medico-scientific world is now profoundly impressed with the idea (we may almost say the belief) that zymotic diseases,

including all the so-called epidemics, are propagated by distinct particles, conveyed by air or by water. We need not call them "germs" or even seeds, or by any other name which would lead us into a labyrinth of speculation, involving doctrines of spontaneous generation and mysteries as yet unfathomable. It is sufficient to call them "contagion-particles" as is done by Dr. Burdon Sanderson in a recent paper of great interest published in the "Twelfth Report of the Medical Officer of the (English) Privy Council." No man has yet seen the distinct thing which, once introduced into the living body, produces such disturbance as to cause the symptoms of scarlet fever, or measles, or typhoid, but its real existence may be assumed from its observed effects, just as Leverrier assumed the existence of the planet Neptune before he saw it, or as chemists assume the existence of an elementary substance before its separation from its compounds.

The conditions and surroundings of typhoid fever in the period of its commencement are now more closely watched than ever before. The general result of this study on the opinions of the medical world has been to encourage the belief that in some way typhoid fever and filth stand in certain relations. There are as we before said many disbelievers, and they are men whose opinions cannot be lightly put aside. But out of this very widely diffused impression have grown various hypotheses, all based upon the propagation of typhoid fever by a poison as definite as that which causes vaccine disease, and all seeking to explain the nature of this poison and the manner of its introduction into the healthy human body. They may be thus divided.

First.—Propagation by drinking water made foul by the decomposition of any organic matter whether animal or vegetable, and specially by the presence in such water of excrementitious matters discharged from the bodies of those suffering from typhoid fever.

Second.—Propagation by air contaminated by any form of filth, and specially by privies, cess-pools, pigsties, manure heaps, rotten vegetables in cellars, leaky or obstructed drains.

Third.—Emanations from the earth, occurring specially in the autumnal months and in seasons of drouth.

We propose to see how far the evidence collected in Massachusetts corresponds with these hypotheses.

The first is essentially English. In reading the reports of typhoid epidemics occurring in England of late years, it so far predominates over all other imaginable causes that we are led to believe either that the English drinking-water must be exceptionally dirty, or that medical observers are unconsciously influenced by preconceived opinions based upon the ingenious speculations of men of ability who have directed their attention to this form of danger.

Dr. Snow of London investigated the causes of the propagation of cholera, and advanced the perfectly original although rather shocking idea that the disease was communicated through the discharges from the bodies of those suffering from this disease thrown upon the ground within the area of drainage of the water supply or into rivers, and thus conveyed in the form of drinking-water to the bodies of those in health. The history of the famous "Broad Street pump" in 1854, and the tracing of cholera from the water supply of different parts of London was strongly confirmatory of this doctrine. Many other observers have transferred this hypothesis to the propagation of enteric fever, and there is much evidence to make it probable. Dr. William Budd of Bristol has been conspicuous in its advocacy. He believes that typhoid fever is contagious, and that the emanations from the sick are the means of its diffusion,—that the affection of the bowels is the specific eruption corresponding to the skin eruption of other contagious diseases, and that the discharges from the intestines contain the specific virulent poison by which typhoid fever is communicated.

If this is so, if the contagion particles are given off in the discharges of the sick, and thus, through the drainage of soil, pollute the sources of drinking-water; certainly, if this mode of diffusing typhoid fever is the one most active, we should expect to find the disease most frequent and virulent where privies and wells are in closest proximity.

There are many large towns in Massachusetts where the surface of the ground is dotted all over with these structures. Lowell, Newburyport, New Bedford, among the most populous places, occur to us as examples. Every one familiar with the State knows that there are a very large number of towns with

a population of from five to ten thousand, compactly built, with no water supply except from wells, and no means of disposing of excrement except by privies, and we know from the registration returns that the people of these towns are more free from the pest of typhoid in proportion to population than the inhabitants of agricultural districts. It is impossible for us to believe that this would be so if water contaminated in the way referred to were the preëminent cause of this disease in Massachusetts. Our Lowell correspondent speaks of a well used by at least one hundred families, containing 52 grains of inorganic and 25 grains of organic residue to the gallon (see his letter for details), and yet the people using it seem to be even less liable to typhoid than others using water of better quality. It is true that he does not give us the experience of a long term of years, but the fact reported is evidently not in contradiction of professional experience in that very crowded city.

The testimony of Boston, as expressed in figures representing deaths from typhoid, ought to be far more positive than it really is, if the drinking-water pollution is the preëminent cause our English friends suppose. Old Boston, previous to 1848, was riddled with wells and privies, side by side, all over its limited and very crowded territory. Sewage contamination of drinking-water was inevitable. The water must have been continually charged with the products of decomposition, and even direct mixture of decomposing animal matter of the most repulsive kind must have been frequent.

Since 1848, the Boston water from Lake Cochituate has been almost as free and abundant as air, and (except, perhaps, from the influence of lead pipe) is of the purest possible quality. Very few wells are now in use, or have been for many years. We do not know of the use of a single one. Here are conditions to test the influence of drinking-water as a means of propagating typhoid, on a grand scale, and, for aught we see, complete. The result seems to be a diminution of typhoid, but in no very striking degree; only such a diminution as might be looked for if the purification of air rather than of water were in question. The sewers are now at all times discharging very large amounts of water, and carrying away from among us impurities which otherwise would linger in the drains. The sewers are more thoroughly washed,—and the people, too.

See also what our Winchester letter says of three years' experience of a foul well supplying water for seven or eight families, and with only a single case of typhoid among them in that period.

The testimony of Worcester and Springfield accords with that of Boston,—that is to say, typhoid is a less frequent disease since the introduction of pure water from without those cities, but the difference is by no means so marked as it would be if contaminated drinking-water were the prominent cause of the disease.

On the other hand, there is satisfactory proof that typhoid fever has been propagated in Massachusetts by drinking-water made foul in various ways. The letter from Sutton is exceedingly clear in its evidence on this subject. The boys' school at Pittsfield is another case in point. See also the Williamstown cases, and the letters from Huntington, Leominster, Leyden and Wrentham. Also the Maple Street cases in our Worcester correspondence.

Some of these are stated in a very general way, but others are so definite as to leave no doubt that the fever-poison was received through drinking-water.

The specific poisons of the zymotic diseases seem to be usually communicated to the blood either through direct inoculation, or as is much more frequently the case by mixture with the air we breathe, through which they are brought in contact in the lungs with the whole torrent of blood rushing through those organs.

Typhoid fever and Asiatic cholera, in so far as they are transmitted through the alimentary canal, are apparent exceptions to this general rule. The most virulent animal poisons of which we have any knowledge, as the snake poisons, syphilis (according to Ricord), glanders and charbon seem to be decomposed, or to lose their virulent properties, or to be appropriated, when introduced directly to the stomach.

Typhoid poison however seems capable at times of resisting the power of rejection or of change which the stomach so often exhibits when noxious things have succeeded in passing the sentinels of sight and taste. Cases are reported in which it is impossible to doubt that the disease was received by absorption through the alimentary canal, but in the great major-

ity of cases occurring in Massachusetts in which causes can be traced, *air* (and not water) must be regarded as the vehicle.

We come now to the second class of probable causes of typhoid, viz.: propagation by air contaminated by filth.

The evidence is here still more direct. Among the most striking experiences are those given in the letters from Swampscott, Hadley, Watertown, Lexington and Marshfield. The Kearsage Avenue cases in Boston seem very conclusive on this point. Running through the whole correspondence is a recognition, more or less complete, of the agency of putrid air in causing typhoid fever. This faith is not universal, yet it seems quite general in the medical profession. There are those who see it plainly and express it clearly, as in the words of our venerable correspondent at Oxford: "So firm is my belief of this (referring to exhalations from foul drains, cellars, privies and pigsties), that when I meet with a case of typhoid fever not readily traceable to some of these causes, I infer that *the truth has not been told me, or that my perceptive faculties have been at fault.*"

And this leads us to refer to the difficulty which is often encountered in tracing to its hiding place the real or probable cause of the mischief. A man almost instinctively resents the supposition that his premises may be foul. It is a kind of personal affront which a physician may well doubt the propriety of giving on mere suspicion, and without proof. A sensible man should, of course, receive such suggestions in the spirit in which they are offered, but, unhappily, all people are not sensible. But suppose suspicion to be excited concerning the state of a cesspool or a drain, or any other concealed structure, or even one only half concealed, like a privy vault. It is by no means an easy thing to learn their exact condition. The bad smell which they may emit is no certain indication (or, perhaps we should say, no certain measure) of their danger to health. There is reason to suspect that the fever-producing poison is odorless, and that, under certain circumstances, it may be set free from decomposing substances before the foul-smelling compounds of hydrogen come to give us warning.

The danger may be greatest when decomposition is (so to speak) going on under difficulties; when it is impeded, suppressed, or imperfect.

But we shall have occasion to refer to this point again, as it seems to be of special significance.

A physician may suspect a connection between a sink-spout or a drain and the family well, but unless the water is offensive to the taste he finds it very hard to prove it without breaking up the ground with much cost and labor. He may suspect similar connections of conduits for air or water or both combined which would poison a family, but the work of tracing them is expensive and troublesome, and requires time and special skill which may not be at his command. It needs perseverance, and a kind of training to be got only by experience to unearth these half-hidden nuisances. Look at the history of the typhoid poisoning of a family in Watertown in 1868 in the preceding correspondence. The first examination of the drain proved nothing; the second was only partially successful; the third made evident the cause of the disease. If the proprietor of this house or his physician had been content with the first search the record of these cases would have come down to us, like that of so many others, as from "causes unknown and perfectly mysterious."

Our readers will observe that decaying vegetables in cellars are very often referred to in the preceding letters as among the causes of typhoid. It is the custom in the country to store potatoes and other vegetables for winter use beneath the dwelling. There is no reason to believe that this practice is harmful provided the vegetables do not decay, but in our long winters it often happens that partial decay cannot be prevented.

A generalization of many of the probable causes of typhoid referred to throughout this inquiry, is to be found in a single expression of our correspondent in Westborough, who says that he has witnessed a connection between decomposing matter and typhoid when the rotting material was *under cover*. This may be interpreted to mean only that the pestilential atmosphere is thus more concentrated, but we are inclined to believe that it signifies more than this. The air of a whole town like Brighton may be filled for months or years with the stench of putridity,—or, as our Brookline correspondent says, filth may be, at certain seasons, strewn upon the lawns so as to taint the atmosphere for weeks, or land may be covered with decaying fish, and yet none of these things produce typhoid

fever, as a general rule ; although we are not unmindful of the apparent exception to this statement in the epidemic following the fish-manuring at Mr. Webster's farm described in our Marshfield letter, and possibly also the fever described in our Provincetown letter. But instances are very numerous in the preceding correspondence where decomposition *under cover*, whether of a cellar or a drain, with a far less noticeable odor accompanying it than is often met with in the open air, or with no perceptible odor, has produced the most disastrous consequences.* Shall we ask organic chemistry to tell us what this certain something is which putrefying material gives forth under such circumstances ? As yet we shall ask in vain.

The third class of probable causes of typhoid fever may be considered under the general designation of *emanations from the soil*.

This includes a large number of well-authenticated observations by physicians, in which the fever-poison seemed to spring from the earth beneath or immediately around the persons affected. In some of these cases the ground was polluted by human agency, and in very many others it was only exposed to those causes by which vegetable matter, the natural product of the soil, was undergoing those changes through which it becomes that brown, pulverulent substance known as "humus," or "garden mould."

It is not always easy to separate these two agencies in the production of that condition of the earth with which the origin of typhoid fever appears to be, in some way, intimately connected. In both of them, however, *soil seems at certain seasons to afford the conditions required for the concoction of this subtle poison, and air to be the vehicle by which it enters the human body*.

Our correspondence is full of illustrations of this general fact.

The exposure of the bottom of ponds and reservoirs in the season of heat and the season of decay,—thus charging the air with the products of the decomposition of leaves, wood, and all

* Dr. Benjamin Rush ("Medical Inquiries and Observations") said sixty years ago, in speaking of miasmata exhaled from putrid vegetable and animal matters, that they are *more destructive from articles which have been confined, than from those which have decayed in the open air*. In the same connection he refers to the greater danger from the decay of *salted* than of fresh meats and fish.

forms of vegetable life mingled with whatever the soil may add to these products, or changed, as the soil alone seems to have power to change them—is, of all others, the most frequent single cause assigned for the production of epidemics of typhoid fever in Massachusetts.

It is referred to in our letters from Berkley, Brookline, Brewster, Coleraine, Dennis, Hadley, Harwich, Hudson, Kingston, Leverett, Mendon, Montague, Pembroke, Rowe, Southampton, Stow, Truro, Walpole, Waltham, Westminster and Hancock.

From Orleans and other towns on Cape Cod, we have similar testimony with regard to ground partially covered in ordinary seasons with mingled fresh and salt water, but occasionally exposed to the action of sun and air.

The effect of turning up soil in causing epidemics of fever is attested by our correspondents in Brookline (both as regards that town and Brighton), Concord and Leverett, and it may be questioned whether the cases described in our Pittsfield letter, as occurring to men who were engaged in laying drain-tiles in a meadow, may not fairly be classed with them.

The Ashland epidemic breaking out in houses just built upon land newly cleared and covered with decaying leaves may also fall in the same category. These cases, especially those of Concord and Brookline, surely point to some poison coming directly from the earth.

The singular difference in the liability of the people of Martha's Vineyard to suffer from typhoid fever according as they may happen to live in the eastern or western half of the island, will arrest the attention of all who are interested in the study of the causes of disease. It seems extremely improbable that the different water-supply can explain it, as is suggested by one of our correspondents on the island. The portion supplied by wells is in this respect like almost every other district of the same size in the State. There is however a broad distinction between the eastern and western half of the island in the character of the geological formation, and of the superficial soil. Professor Ditchcock's geological map of the State (1841) represents Martha's Vineyard in two portions, divided by a line running north-east and south-west, and corresponding very nearly with the line referred to in the preceding letters as

marking the boundary between the typhoidal and non-typhoidal portions of the island.* The western section is geologically unlike any other part of Massachusetts, and is described as corresponding to the deposit in Europe long known under the name of Plastic Clay, but now as a part of the Eocene Tertiary. It crops out in the cliffs of Gay Head, forming from the various colors displayed a remarkable and picturesque object well known to geologists. The eastern section is quite different, being composed like Cape Cod of diluvium or drift.

But the peculiarities of the surface are probably quite as important for our present inquiry as the underlying formations which are the special subject of geological research. In the western, or typhoidal section of Martha's Vineyard there are hills and valleys with abundant vegetation on a rich surface soil, overlying a stratum of clay. In the eastern, or non-typhoidal section there is a blank, level, barren expanse of sandy drift, perfectly pervious to water at all depths.

This combination of rich surface soil with a subsoil of clay has been elsewhere remarked in our letters as seeming to co-exist with typhoid. The high hill described in our letter from Newton had a "subsoil of tough marl," while the village had an "unfathomed bed of gravel." Fever occurred on the hill, and was almost unknown in the village. See also the letter from Rutland in which, although not fully explained with reference to this particular point, the circumstances would appear to be similar.

If we may suppose that a clay subsoil tolerably near the surface prevents the subsidence of materials undergoing decay to a point where they would meet the constantly moving current of subsoil water, it would seem probable that a ledge of rock would have the same effect. Our correspondents at Worcester, at Rockport, and at Beverly have remarked something of this sort. At Worcester there is a ledge thinly covered with earth, on which are built excellent houses, having all pro-

* The line of division on the geological map of Massachusetts runs from Muddy Cove near the northern extremity of Great Tisbury Pond to the southern extremity of Lagoon Pond.

The *Eocene Tertiary* includes all of Chilmark, two-thirds of Tisbury, and a little corner of Edgartown. The *Drift* includes one-third of Tisbury and nearly all of Edgartown. These two portions of Martha's Vineyard are of apparently equal extent.

visions for health and comfort, but typhoid is a more frequent visitor there than in other parts of the city.

In a manuscript report of lectures on continued fever by the late Dr. James Jackson of Boston, taken in his lecture-room about forty years ago, we find these passages. After speaking of the great obscurity of the subject, he says:—

“From analogy with intermittents, we are led to suspect the cause from local miasm, occasionally confined to a particular house, continuing perhaps six months, and affecting the members of the family successively.”

Dr. Jackson reports cases in proof, as follows:—

“A family moved from the country into a new double-house in Boylston Street, and were all attacked with fever. No visitors took the disease. None were sick in the other part of the same house, though both drank from the same well; and none were sick in the vicinity. No nuisance could be discovered, and yet we must suppose some local cause not offensive to the senses as in other cases, or else contagion, which last we have seen did not exist. Such family diseases often occur. Dr. Jackson had known thirteen persons sick in one family, isolated in the country. Sometimes the disease is limited to small districts; most often in Boston at the South End, and about Hartford Place and Fort Hill. Persons going to these districts take the disease, but persons removed from them do not communicate it. This must be caused *by some material in the ground itself*, not by the water or anything on the surface.

“Sometimes it pervades a whole city; it is then of a more mild character. Nor is this peculiar to thick settlements, but it occurs in limited districts in the country. An argument against contagion is that the fever breaks out in many different spots at the same time. Sometimes a very large district is infected, perhaps a hundred miles square, as was the case in the epidemic of spotted fever. In all cases the disease is confined to a limited district, and many are affected without any communication with diseased persons. So that all the cases of the disease cannot be attributed to contagion, and if most cases can be accounted for without contagion, it is probable that all may be.

“The cause of disease is *in the soil itself*, for if it was from the atmosphere, the disease would be much more extensive than if from

the soil, and even there it is very slowly developed. It rises indeed into the air, but is then so much diluted* as not to produce disease. The analogy with intermittent fever renders this probable."

In Dr. Jackson's published lectures (1825), after referring to the subject in similar terms to those just quoted, he says:—

"These facts taken together and compared with what is known respecting the causes of intermittents, create a probability that some emanation may take place from the soil capable of producing continued fever; yet, if this be admitted, it must be allowed that the material thus emanating is not known, the qualities of the soil from which it arises are not known, and the only advantage from the observation is to lead us to avoid the places in which fever prevails."

Certainly here is to a certain extent corroboration of the modern views of Pettenkofer to which reference has already been made. Pettenkofer says that when soil is "typhoid ripe" the disease appears; and that it becomes ripe through "organic processes" taking place in the earth. This expression is constantly used by him, but we have been unable to find in any of his writings on the subject any more definite explanation of the term. That he would convey the idea that these "organic processes" are the changes involved in decomposition seems evident enough.

It will be seen from the tabulated replies to the second question of our typhoid circular, and from the letters which we publish, that it is not possible as yet to know whether the same rule with regard to ground-water holds good in Massachusetts as in Munich—that is to say, whether the fall and rise of subsoil water corresponds with the increase and subsidence of typhoid epidemics. There can be no doubt whatever that the season when the level of water in the wells is as a rule very low from the absence of rain, is the season of typhoid fever throughout New England. A perfectly well-marked coincidence is here observable. Beyond this, the special ideas of Pettenkofer concerning ground-water have not been put to the proof.

* See the remarks of our correspondent in Dudley about *sleeping on the ground floor*.

A large number of correspondents assure us that in future epidemics the change of water level in the wells will be noted.

If we may imagine that the organic matter retained in soil near the surface under certain conditions of season and temperature gives rise, in the course of its return to inorganic elements, to some specific product as yet unrecognized by organic chemistry, we may see how the specific poison of typhoid fever may be generated.

The secrets of organic changes are for the most part hid from human eyes. Yet the poisonous aldehyde, produced under certain circumstances in the process of acetous fermentation is now well known. We may not despair of yet seeing the typhoid poison made equally manifest.

Physicians know that in the decomposition of the human body there is a period, soon after death, and previous to the evolution of offensive gases, when the fluids often possess poisonous properties. Dissection wounds are then far more dangerous than when decomposition has become advanced.

So we may find that when the decay of organic matter, whether in soil or anywhere else, has become evident to the sense of smell, the danger to the health of those exposed to it, in so far as that portion is concerned, may have passed its maximum. But these are mere speculations, to be overthrown or confirmed as science advances.

We have no disposition to enter at length upon so obscure a subject as the influence which may be exerted on health by dwelling upon special soils. Yet we cannot forbear to express our conviction that in this direction will be ultimately found an explanation of many things in the history of disease which are now mysterious. The property which earth possesses to render harmless the most revolting substances, a property known to the Jews from the earliest times and recently revived in plans for the disinfection of human excrement; the salutary virtues which fresh clods of earth are known to possess in removing animal poisons, as known to the Indians and to us their successors in America, and recently employed in the dressing of suppurating wounds; the influence which dwelling upon *wet* soil has been recently shown to have upon consumption; the influence (recognized in all time) which certain soils have upon intermittent and remittent fevers,—all these

observations point to *the earth* and the changes as yet unexplained which are there constantly taking place as the source of influences bearing directly upon our health and life.

The analogy between fevers generally known as miasmatic (intermittent and remittent) and the continued or typhoid fever of New England, pointed out by Dr. Jackson, becomes very significant when we look at the experience of practitioners all over the State with reference to the bottoms of ponds and reservoirs laid bare in the seasons of drought. These are the very places which would surely give rise to intermittents in our Southern country. Here they give rise to fever without remissions,—to typhoid.

Another analogy with intermittents may be seen in the greater liability to typhoid on the part of new residents, as referred to in our letters from Ashland, Fall River and Lowell.

Some of the possible influences of soil on health become more intelligible when we consider how much air it contains, and how readily this may become the means of transmitting anything which the soil may hold to those who dwell above it. A vessel of any sort filled with dry earth compressed as much as possible will still absorb one-quarter to one-third of its bulk of water without overflow. All this water represents space which has been previously occupied by air. If we look upon the soil as a kind of cover to what lies beneath it we must remember that the cover is not tight, that it is always partially open, and that whatever recondite properties the soil may hold, whether for good or evil, will be sure to come to the surface through the agency of air, which must change its position with the slightest change of temperature, such as must be occasioned by the alternations of day and night. Gases produced by decomposition must of necessity rise to the surface; moreover our houses are, in effect, bell-shaped enclosures, in which are retained with more or less completeness whatever the soil beneath us may have to render up.

On the question of the propagation of typhoid fever by contagion there is little new to be said, and what is old is contradictory. When two such authorities concerning the fever of New England as Dr. Nathan Smith and Dr. James Jackson differ in opinion on this point, we may be sure that it is one not readily settled. That typhoid is contagious in the same

degree as smallpox, measles or scarlet fever, no one perhaps would affirm ; yet many believe it to be communicable at times like erysipelas and puerperal fever.

Facts and opinions relating to the contagiousness of typhoid fever may be found in our letters from Dennis and Franklin.

The single continuous thread of probability which we have been able to follow in this inquiry leads uniformly to the *decomposition of organized* (and chiefly vegetable) *substances* as the cause of typhoid fever as it occurs in Massachusetts.

Whether the vehicle be drinking-water made foul by human excrement, sink drains, or soiled clothing ; or air made foul in enclosed places by drains, decaying vegetables or fish (Swampscott), or old timber (Tisbury), or in open places by pigsties, drained ponds or reservoirs, stagnant water, accumulations of filth of every sort, the one thing present in all these circumstances is *decomposition*.

And may not the influence of soil charged with vegetable remains, in the season of heat and of drought, be also referred to the same cause ? Although not yet proved, it is exceedingly probable that *a rich and fertile soil in which decomposable substances are retained near the surface by any cause, whether a clay subsoil, or a ledge of rock, or a protracted drought, is a soil favorable to the production of this special disease.*

The all-important question remains to be answered, whether, if these are the causes, typhoid fever can be avoided. With the single exception of such changes as may occur in soil through natural processes, all the various causes assigned are within human control ; they are indeed instances of human neglect ; of the omission of what all human experience has shown to be necessary for the preservation of the highest condition of general health. And standing in the connection they do to one of our most destructive special diseases, they but enforce the truth of the general statement that clean air and clean water are among our greatest blessings.

As regards soil, and the obscure processes, doubtless connected with decomposition, which seem at certain seasons, and under circumstances as yet ill-defined, to play so important a part in the production of continued fever, we are certainly far

less able to guard against its influence. Yet we are not quite so powerless in this respect as might be inferred from a passage quoted from the lectures of the late Dr. James Jackson. It is now more evident from what kind of soil typhoid fever springs.

The comparative exemption of crowded cities and towns leads us to believe that their more solid pavement, seldom disturbed, and free from vegetation, is a real protection against the emanations of the earth. Although those who live in the country are necessarily surrounded by open ground, they can have cellars thoroughly cemented,* and, in the season of typhoid at least, they can usually avoid sleeping on the ground floor.

We cannot more fitly conclude these remarks on the probable causes of the typhoid fever of Massachusetts than by again quoting one of the most original and far-seeing men of the last century, Dr. Benjamin Rush, who says: "To every evil the Author of Nature has kindly prepared an antidote. Pestilential fevers furnish no exception to this remark. The means of preventing them are as much under the power of human reason and industry as the means of preventing the evils of lightning or common fire. I am so satisfied of the truth of this opinion that I look for the time when our courts of law shall punish cities and villages for permitting any of the sources of bilious and malignant fevers to exist within their jurisdiction."

* It is greatly to be desired that some material more impervious to gases than hydraulic cement should be used for the floor of cellars in both country and city.

LETTER

FROM THE

CHAIRMAN OF THE STATE BOARD OF HEALTH,

CONCERNING

HOUSES FOR THE PEOPLE, CONVALESCENT HOMES,

AND THE

SEWAGE QUESTION.

LETTER.

Boston, December 10, 1870.

To the Members of the State Board of Health of Massachusetts:—

GENTLEMEN,—During the past summer, while I was residing in London, I thought I could not serve Massachusetts better than by investigating, as thoroughly as I could in the short time at my disposal, the homes of the London poor, and some of the means now used to improve them, together with some other topics of similar importance. The results have been of very great interest to me. I have therefore embodied them in this letter to you, hoping that you may regard my labors as not wholly useless in our important public work. The subjects may be divided into several sections, each of which is a distinct statement, and may be read without regard to its companions.

First. A night-stroll with a London police inspector, compared with a similar one taken afterwards in Boston.

Second. Operations of philanthropy, solely or chiefly as shown in the Peabody Buildings and Miss Burdett Coutts's Market, Reading-Room and Home at Columbia Square.

Third. The operations of the "Improved Industrial Dwelling Company;" or, philanthropy and capital united, with success to both.

Fourth. The Jarrow Building Company, by which a tenant becomes a proprietor of the home he lives in.

Fifth. Organized work among the poor, inaugurated by Miss Octavia Hill, assisted by Mr. Ruskin and others.

Sixth. A comparison between a model lodging-house, and a low tenement-house in Boston.

Seventh. Convalescent homes.

Eighth. The "sewage question" in England.

I.

A NIGHT-STROLL WITH AN INSPECTOR OF THE LONDON METROPOLITAN POLICE, AND A SIMILAR WALK IN BOSTON.

On the evening of July 20, 1870, I started with a friend on a walk through the purlieus of Whitechapel and of Ratcliffe Highway, two of the most noted thoroughfares of vice, poverty and crime in London. Our arrangements had been previously made with the chief of the Metropolitan Police. We were directed to report ourselves at 9 P.M., at the L—— Street Station, there to meet Inspector G——. Prompt at the moment named, we appeared, and were graciously received by the chief of the station, who introduced us to our guide.

We had confidence in him from the first glance. He had a mild, but, at the same time, a fearless look, and his muscular powers were evidently such as to make him capable of coping with the roughest. After examining the station itself, its arrangements for the comfort and convenience of the policemen, and the cells for the prisoners, we started for the specific object we had in view, viz., inspection of the public lodging-houses of the poor and criminals in that part of London, and over which, in certain points, the police have an almost supreme control.

During that long walk from 9 P.M. until 2½ A.M., I met with persons and events of the deepest interest. We visited the lowest dens of private degraded poverty and crime, and strolled leisurely through whole streets in the “thieves’ quarter,” so called because occupied by these prominent members of “the dangerous classes.” We saw women and children working at dead of night under the bright gaslight of the obscure and filthy courts in which they lived. We found an orphan girl about 14 years of age thus toiling for a mere pittance, to support three younger brothers and sisters. We followed closely in the steps often before trod by Dickens, and saw the opium-smoking hag he has so graphically described in *Edwin Drood*. She blew out before us, as before the great novelist, huge blasts of smoke

from her broad animal-like nostrils, as she lay in a half-dreamy state across her filthy bed. In one dark alley, so narrow that our party went in single file, and I was the last, I observed a little girl flitting around me, and while scarcely able to see them, I felt her tiny fingers fly about my pockets with a lightness, and an exquisite delicacy of touch, worthy of one of Fagin's most apt scholars. Though I knew she would be unsuccessful, because, foreseeing such an occurrence, I had carefully emptied every pocket, nevertheless, the sensation was anything but agreeable during the few moments I felt the process going on in entire silence, and almost complete darkness. Almost everywhere in these dark passages were dimly seen or heard, dusky human beings lying or sitting, sleeping or talking in undertones. At times they were sauntering about as if the night hours were their "opening day," and home was no place for them. Indeed, the private houses into which our guide led us, were wretched and filthy enough to drive away any one not wholly lost to decency and cleanliness. Our walk culminated with a bloody assault made by a noted bully upon a young girl, probably some poor outcast, who having no proper home in which she could rest, was flaunting out in one of the narrow streets of the "thieves' quarter," as late as when the morning was just breaking. We entered and examined one of the public lodging-houses, where the poor, vicious or criminal congregate at night, and which, for the past few years, have been under the strict surveillance of the police. Any man has a right to open one of these houses, but he must do so in strict conformity to law, and be constantly inspected by the police. We saw one house capable of receiving three hundred males. We stumbled up the clean, but uneven and rather circuitous staircase, and entered a large room nearly filled with single and narrow cots. Many of them were occupied with stalwart men. In the dim light of a low gas-jet their half-naked forms looked Herculean, as the men either slept unconscious of our presence, or hastily drew up the covering which the warmth of the night had induced them to throw off. Every such public house is obliged to be kept clean, and to provide at least three hundred cubic feet of air for each lodger. Usually there are passages for ventilation permanently opened in the walls. Plenty of water and numerous wash-basins are found below. Immense kitchens,

with their perpetually burning fire in the grate, afford to each lodger the means of cooking his meal. In one of these houses, occupied by known thieves, nothing easily portable is seen. Even the brass stoppers of the wash basins have disappeared,—a bit of cork, having no real value, alone remains. No knives or forks are to be found; they have been stolen, and no new ones have since been bought. In such lodging houses, whether in the “thieves’ quarter” or elsewhere, 3d. per night is the price for lodging, or 18d. per week.

One or more lodging houses we visited in which both sexes are admitted. Theoretically, only married persons are admitted, and each couple has one pen so to speak, allotted them for 6d. per night. That is, a large room is divided into compartments just big enough to hold a double bed, and to allow a small space in which to move around. Each partition wall is about eight feet high, but not reaching to the ceiling, which gives in a general way some circulation of air. One cannot be sure that such places may not be used at times as assignation houses. But there is little danger of this difficulty becoming very common, for over these, too, the police have despotic control; and a house would be closed that became infamous for prostitution when intended simply as a healthful lodging house. Long after midnight our walk continued. About a quarter to one A.M., our guide rang the bell of the “Casual Ward” of the district. Similar places, under the same name, are now found almost everywhere in England, and usually in connection with the union poor-houses.

Wherever in England a houseless wanderer appears at night, there will these evidences of Dickens’s generous heart and all-powerful pen be found ready to receive him. They have their origin in the fact that he, in the very locality where we were then standing, had, during one of his midnight strolls with the police, seen many persons lying one cold night on the doorsteps of the Union Workhouse,—they had been refused admission even there, “because of want of room.” Dickens’s feelings were enlisted, and he used most efficiently his voice and his pen, until, by law, every man, woman and child in England who needs shelter can claim at least for one night, lodging, a supper, a warm bath and breakfast next morning, and perhaps some articles of new clothing are given if those used before entrance

be ruined or contain any "contagium" that will be injurious to the public health. In payment, a certain amount of labor is performed if required.

The porter soon responded to our summons. We examined everything about the establishment. It was of that exquisite neatness and cleanliness so peculiar to England. The bath-tub was as white as the driven snow; the beds were compact and clean; the floors without a trace of dirt. In the reception room we saw the signature made by Dickens at his *last* visit to the spot, only a very few months before his death.

In conclusion, I will express my admiration for the way in which English law,* and its official, who accompanied us under that law, deal with the public lodging-house system of the poor, and with the poor and vicious themselves of London. The rooms and walls of some of the buildings used as common lodging-houses in Whitechapel, are as clean, if not so fine, as those of many a palace, or humbler English home. At present the law does not feel at liberty to be so despotic in regard to the English working-man's *private* home. If he choose to have filth in his own premises the law does not usually prevent it. It is his castle, and therefore sacred to private right,—a most noble maxim indeed, unless it be carried too far. I believe the time will come in England, and in Massachusetts also, and it will come with the consent of the whole people, when the community will feel that an impure moral or physical *private* abode is a nuisance and crime against humanity, as much in quality if not in degree, as the filthy, ill-ventilated public lodging-house, and as such, it will be abated, if need be, by law.

Again, this thorough police inspection of public lodging-houses of the poor is the commencement of a great sanitary reform. It is complimentary to the many private enterprises for improving the houses of the people, as now carried on by private charity, or by enlightened capitalists.

Before examining the private London enterprises to improve the homes of the poor, we must compare my experience during a walk with the police of Boston with this which I had in London. Some captious person may exclaim: Why tell us about London purlieus and England's "thieves' quarters," and

* Appendix A, for summary of English law on Common Lodging-Houses.

other abominations and her laws? Have we any such places, and do we need any such laws? To such a critic I would say: Come with us in our walk *with the police in Boston's* "highways and by-ways."

I shall be surprised if the critic, after the perusal of the following account of our walk in *our Radcliffe Highway*, does not see some reason for my details upon the abominations of London, and still more for my account of the efforts recently made by English law, and by private and public charity and capital to relieve these abominations. The very similarity between London and Boston in one respect, viz., in the wretchedness of the houses of the poor in both, and the contrast between the two cities in their relative action, tending even partially to relieve that wretchedness, will I think, suggest topics worthy of serious reflection by every man and woman in the State.

At 8½ P. M., of Dec. 1st, 1870, we* met by previous appointment at the Hanover Street police station. Our guide not having arrived we sat a half hour, and during that time, a well-dressed but drunken woman was brought in reeling, and she was forthwith transferred to the cells below. Soon afterwards a man who said he was about 50 years old—a "worker along shore," and who got his meals "here and there on the street once in a while," and who "had no home," claimed a lodging. He was kindly received, but I saw none of the paraphernalia of Dickens's Casual Ward, and no food is usually given.

The station, in every respect, is superior to that at L—Street, London, both for the police, and the prisoners. This was probably owing, in some measure, to the fact that the Boston station was built for the purpose, whereas that in London is an old building, aristocratic looking, it is true, with its sweeping and ornamented staircases, and its large rooms. But they are not adapted to the purposes intended, even in that portion occupied by the police; and in others where the prisoners were kept they were rather crowded. The Boston station, however, I do not think, in some respects at least, entirely proper for human beings, however degraded, to be compelled to stay in even for a short time. The cells are in the cellar. They seem clean. The outsides of them are scrupulously nice. The com-

* The Secretary of the Board, Dr. Derby, had previously made arrangements with the Chief of the Police. We went together during the evening.

forts for passing the night are very small. Four persons can be shut in one room. Four *bunks* are arranged in some, and these are made of strips of thin iron about an inch wide. At the head these strips are sloped, apparently to serve as a pillow. No mattress or even straw to lie upon, or covering of any kind were visible. The whole cellar at the time of our visit was heated intensely by means of steam, or hot-water pipes. "We have no blankets," said our guide, "so we have to keep the room warm." The earnest appeals for cold water from the various cells were quite striking to us strangers, and the behavior of one of the prisoners when the cell door was opened, was quite suggestive of suffering undergone. Hastily, and without waiting for the ceremony of a cup, he ran towards the pipe, and bending down with his face turned upward, and his mouth distended, gulped down a long draught of Cochituate from the open water-pipe. It was like the long draught of a thirsty animal taken from some running stream during the hot noon-day.

Soon afterwards we started on our walk and almost immediately entered Stone's yard, where about a year ago a murder was committed. Our guide lighting a bit of tallow candle which he carried with him, led us up a broken and dirty staircase, which, for its filth and dilapidated condition, was quite equal to anything I saw in London. In the chamber of murder we found a mass of extreme wretchedness. A young man was crouching beside a hot hard-coal iron-pot stove, while another, a red-eyed, sinister and dogged-looking youth, was seated apparently for want of any better place, on the foot of a nasty bed. One old woman was gleaning with her skinny fingers bits of coal from a mass of half-burned ashes and cinders, while another stealthily looked at us from a corner where she sat upon the floor. I felt quite secure with our guide, but I should have shrunk from being there alone at night. "How came you here?" asked our guide of the red-eyed individual above alluded to. "I came to visit that man," was the only and curt reply. "And who is he to whom you spoke?" I asked, after leaving the filthy spot, and getting into the open air. "He is a thief, and has no other business. He is not a bold operator. He steals little things, here and there. He loves to rob drunken men when they are asleep upon the sidewalk or door-steps, and

sometimes he makes a fine business of it. One of the prisoners you saw this evening was found drunk, and with over two hundred dollars in his pocket." The passage-way leading to this court, and the court itself, are simply infamous with their stinks. That sharp, Saxon word alone expresses the thought I wish to convey. The privies were filled to overflowing, and covered with nastiness to the extent of two or three feet from the seats, when I visited and inspected them six months ago, and from what our noses and our eyes, with the aid of our dim light could perceive, there has been no improvement in the interval.

In these passages were passing and repassing several persons, young and old, male and female, apparently peering at us intruders in their private premises, and yet how did they stand with relation to the landlord of these filthy abodes? As our guide informed us, the rent is rigidly exacted, and if not paid the scanty furniture is summarily pitched out into the filthy passage-way, and the tenant is ejected. My indignation is excited to think that the city authorities allow even one such tenement to remain to taint the atmosphere, both physically and morally, of the whole neighborhood, especially when we have laws stringent enough to abate this and many more similar nuisances that are scattered here and there in Boston. More especially am I indignant to think that some of these houses are at times owned by men living in luxury, in our most fashionable places, men moving in political power, nay men of irreproachable religious *appearances*, who talk of Christianity, and perhaps listen with becoming gravity to the beautiful teachings of the Sermon on the Mount, Sunday after Sunday.

These men will either themselves, or through some paid agent, receive of the landlords who sub-let these hells on earth, the hard-earned pittance obtained by vice or crime perpetrated by the denizens of these filthy tenements. While in London I heard from what I deemed good authority of nobles of the land fattening on the price gained by whole streets of brothels, and even some ancient ecclesiastical establishments, surfeited with the wealth which land in London gives to every large proprietor of it, have not, it was said, quite clean skirts in this particular. Similar men and similar buildings exist in Boston. Public opinion ought to condemn such persons and such buildings as I

have described in London, and shall still further describe as seen during this walk. But neither Old nor New England at present cares to do so. Every one has a right to let his own house as he pleases. If he choose to sub-let to a Carker, or even a Fagin, no one can complain. He may, week after week, shut his eyes to the real cruelties and enormities perpetrated on his own premises, provided only that the fawning agent will pay into his patron's already overflowing coffers the rent justly (?) his due. This may seem hard language ; nevertheless I believe it strictly true. Public opinion should bring such landlords to strict social justice, and the public law should summarily abate the physical nuisances on their property. But let us walk on. Every other house in certain large parts of North, Cross and Richmond Streets has a dancing hall connected with it. We visited several of them. Nothing improper in the behavior of the inmates was observable. In one place blacks and whites were mingled in the mazy waltz, and the gentle whirls of the dance, as performed by a beautiful white girl of about sixteen, with her negro partner, presented nothing (save in that union) that would have been inconsistent with society as seen in any of the palatial residences in the Commonwealth or Fifth Avenues of Boston or of New York. Bars stand near each dancing room, and after the dance is over those engaged pay ten cents and "treat" their partners, I was glad to see not to intoxicating drinks, but to milder beverages. The proprietors of these places know their own interest too well to allow of liquor being sold. That would produce riot, and riot would soon close the establishments. The proprietors know the varied allurements, strange as that word may sound, of these places are enough without dram-drinking, and as I watched the dance going on, I thought that possibly it was the only ray of real pleasure that shines down upon at least some there who were engaged in it. The young love to dance, and the child trips with her feet to the sound of music as naturally and as gleefully as the lamb skips under sunny skies over the greensward. The act of itself is harmless, though Puritan religion formerly condemned it as always fraught with evil. It may be sanctified to virtue and to the highest amenities of human life when used legitimately within the precincts of home. Those living in these places, however, have no proper home. Many of the lodging

places are simply horrible. To know this, stoop with us, and crawl cat-like down this dark cellar-way, and see a *home* in Boston! This cellar room is scarcely high enough for us to stand erect. One can easily almost touch each of the four sides while standing in the centre of it. The floor is dark, dirty and broken; apparently wet also, possibly from the tide oozing up. Two women are there, commonly, yet rather tawdrily dressed, and doing nothing but apparently waiting, spider-like, for some unlucky, erring insect to be caught in their dusty but strong meshes. Tubs, tables, bed-clothes and china ware, are huddled incongruously together. Our guide strikes a match by the stove, and then opens a door into a so-called bed-room. It is a *box*, just large enough to hold a double bed. No window is in it, no means of ventilation, save through the common room up the cellar steps. The bed is of straw, covered only by a dirty blanket. Everywhere is the picture of loathsome filth. The stench, too, of the premises is horrible, owing to long accumulated dirt, and from the belching up of effluvia from solutions of dark mud, reeking with sewage water from the city drains and water-closets. It is difficult for us to breathe in the tainted atmosphere. We feel ourselves enveloped in a physical atmosphere most horrible, and a moral one most degraded. We glance into another "bed-room!" opening by another door into this common room. It is a fac-simile of its neighbor. Upon the dirty blanket lie recently washed and finely starched wrist-cuffs, and the jaunty modern hat and feather now worn by all. The strange contrast between fashionable neatness and exterior properties of appearance with supreme nastiness was never more strongly manifested. "How much do you pay for these rooms?" we asked as we turned to leave. "Four dollars a week!"

"Take care of your heads" said our guide, as we again, in single file, crept up the cellar stairs, and tried to breathe again freely in the open street, after stooping low to avoid the blow we should inevitably have received if we had walked erect. "Yet," quietly remarked our guide, "in just such places, strangers, men of respectability from the country, go and lose their money and their watches, and then come stealthily to us begging us to regain their property without bringing shame on themselves." What a revelation! I saw no worse home in

Whitechapel. I even doubt whether any so bad can exist under English law. And this was not a solitary example. We visited several of the same type. If any faith can be put in the idea of an overruling, retribution-paying Justice ; if any confidence can be placed in all the deductions of modern sanitary science, Boston will sometime suffer the heaviest of penalties for its great guilt in these matters. Nay, is it not even now suffering the direst of calamities in the deleterious influences exerted on every child born within such dens ? In one place, while our guide, with the usual nonchalance that long possession of known and acknowledged authority always gives, was lighting his candle, a woman earnestly called out, "Please take care and don't wake the baby." "Oh, no," replied our guide in kindly tones, "the baby shall be taken care of." Following his light, we with difficulty ascended a very narrow and broken staircase leading from the cellar to a chamber, if it might be so called, above. It was of an irregular shape from three to five feet broad, twelve to fifteen long, and contained three beds. One of them was a small one and on it lay a beautiful babe about six months old. Its little arm was lying outside the dark and soiled bed-clothes ; its dimpled fingers were as delicate and beautiful as a child's alone can be. It was calmly sleeping in that den of all uncleanness, unconscious of its future fate. And how hard must inevitably be its fate, it was plain enough to foresee. Born amid the haunts of vice and crime, bred in filth, how could it ever know, at least in its tenderest years, the sweet delights of a clean and happy home ? What more natural than the thought which arose uppermost in my mind while looking down upon the little sleeper, "Would that you had never been born. Here you are, beautiful of form, and with all the capacities perchance of an archangel for intellectual development and for moral worth. Yet what chance have you, in this fierce struggle of life, of gaining either ?" One might as well hope to train up a California pine in the darkness of a cellar, while bruising each hour some tender shoot as it is struggling towards the light and air of heaven, as to raise a child to perfect physical health, real learning and virtue in such a spot. And yet such spots are numerous in Boston. Proud is our city and justly so of her churches, her religious freedom and her public schools. But of what use are

her churches, her freedom and her schools to those of her children, whom she allows to grow up in such places as these I have attempted to describe. All these advantages are a mockery even and a snare ; for while we piously exclaim, “ See how good and learned we can make our citizens,” at the same moment, we are allowing such evil influences to exist broadcast amongst us. I am not such an optimist as to believe that we can root out all vice by building houses, but I do contend that if for no other purpose, for the physical good of the persons themselves, and for the safety of the public health, nuisances like this vile abode I have attempted to describe should be summarily dealt with by the law, and that better houses should be everywhere erected for the people, even the most vicious and degraded. Where are our lines of Peabody, Burdett Coutts or Waterlow buildings ; our “ Casual Ward ” or our cheap public lodging houses, with plenty of air and fresh water given to every one by the law of the land ? Where are our “ organized workers among the poor ” ? For sanitary if not for moral reasons would I urge these questions warmly home upon our citizens individually, and upon the public authorities.

II.

OPERATIONS OF PHILANTHROPISTS FOR THE IMPROVEMENT OF THE DWELLINGS OF THE POOR IN LONDON.

Under this head I shall allude to the Peabody Buildings, and to those erected by Miss Burdett Coutts.

I fully concur in the following words emanating from three eminent men of Great Britain, viz. : Dr. W. T. Gairdner of Glasgow, Mr. Rawlinson and Mr. Druit of London.

Dr. Gairdner says : “ On whatever other points sanitarians may differ, there is a remarkable concurrence of opinion as to the primary need of improved house accommodation for the lower classes.” (Remarks on the Sanitary Condition of Glasgow.—*London Lancet*, Oct. 15, 1870.)

Mr. Rawlinson, in his address before the recent Social Science meeting at Newcastle, stated in rather strong, but I think true words, that "defective house accommodations produce disease, immorality, pauperism and crime, from generation to generation, until vice has become a second nature, and morality, virtue, truth and honesty are to human beings so debased, mere names."

Mr. Druit (address at the meeting of the Association of Medical Officers of Health, as reported in *Medical Times and Gazette*, Oct. 22, 1870): "For myself, I do not hesitate to avow my belief that, for the dwellings of the laboring classes in cities, provision must be made by public authority."

A philanthropy, which raises a man's self-respect and not a mere charity (which usually lowers it) lies at the basis of the operations seen in the Peabody and Burdett Coutts Buildings.

THE PEABODY BUILDINGS.

The world knows the fact of their establishment in London by the late Mr. George Peabody, who gave £500,000 as a fund for that purpose. In his letter to the trustees, he writes that he wishes "the fund or a portion of it to be used in the construction of such improved dwellings for the poor, as may combine in the utmost possible degree the essentials of healthfulness, comfort, social enjoyment and economy."

I have visited and examined carefully all the buildings at present erected, I have conversed with the superintendents of each, and will here give a general summary of the results of these inquiries.

There are five series of houses, viz. : at Chelsea, Spitalfields, Islington, Shadwell and Westminster.

The following table shows the number of buildings and number of families that can be received, and the general rates of prices per week :—

PLACES AT WHICH THE BUILDINGS ARE ERECTED.	No. of Buildings at each.	No. of Families each can receive.	PRICES.			
			One Room.	Two Rooms.	Three Rooms.	Two small Rooms.
Chelsea, . . .	4	136	2s. 6d.	4s. 0d.	5s. 0d.	— —
Islington, . . .	4	165	2 6	4 0	5 0	— —
Spitalfields, . .	*	58	2 6	4 0	5 0	— —
Shadwell, . . .	4	200	2 6†	4 0‡	5 0§	3s. 6d.
Westminster, . .	3	175	— —	— —	— —	— —
Total, . . .	. . .	734	— —	— —	— —	— —

* Spitalfields buildings are built on an irregularly shaped lot of land, in a great thoroughfare, and therefore cannot be compared with the others.

† Reduced lately in consequence of trade falling off, to 2s. 3d.

‡ Reduced lately in consequence of trade falling off, to 3s. 3d.

§ Reduced lately in consequence of trade falling off, to 4s. 3d.

No tenant can enter the buildings if he receives more than thirty shillings weekly. It would thus appear that these buildings are intended for the poorest. They are scattered in various districts of the metropolis. Some are more in demand than others. Westminster, for example, is constantly full, with applicants in advance. Shadwell, on the contrary, though of most palatial grandeur and with fine appointments, has recently lost several of its tenants, because trade (in ship building), which was very brisk a few years ago, has now wholly left the Thames, in consequence of the persistent strikes in which the workmen on the Thames have indulged. The trustees have, therefore, felt obliged to reduce the rents of all these rooms, and one-quarter of them, at the time of my visit, were unoccupied.

With the exception of Spitalfields, which being on an irregular and rather confined thoroughfare, is of an irregular shape, the groups of buildings are all erected in a rectangular form, with broad intervening spaces, allowing free access of light, sun and air, and at the same time, in the centre is a playground for the children. The surroundings and the passages are all very neat, and generally paved, either with flat flag or flint stones, and in one instance simply covered with gravel.

In these, parties of laughing children are almost always playing. None from the outside are allowed to enter. To one standing in these squares, the buildings present not only a very neat appearance, but some of them (Westminster and Shadwell) have an air of real grandeur. Moreover, the enthusiasm of almost all the occupants of the rooms for the cultivation of flowers, which of late years seems to have become a real passion with the English people, increases the beauty of the building, as some most brilliant displays of blooming plants are made from many windows. If the scene at times becomes very striking and picturesque even to the eye of the casual visitor, so it must have a benign and refining influence upon all the inhabitants of the place.*

A small black or bright brass knocker is upon each family's door, and it was touched by the superintendent with as much deference, when calling upon the occupants, as if he were tapping upon a street door in Belgravia or of Beacon Street. The Peabody Trustees evidently mean that every man shall consider himself as really at home, when he enters their buildings, as if he occupied a palace at Hyde Park. The deportment of all the superintendents in this wise impressed me very favorably.

The rooms were clean, and the various arrangements for cooking were admirable. The houses have long corridors running directly through the centre and along the entire length of each story. These corridors communicate with a central staircase of stone steps. The ceilings are not very high, and the corridors are ventilated and lighted by a window at each end and partially by the central staircase opening. There are two water-closets at each extremity of each corridor. All the front doors open on these same passages. Hence I should fear two results may, at times, happen deleterious to health. Unless great care be constantly taken, the passages may gradually become soiled. Filth may accumulate and noxious vapors arise from the water-closets, provided they are not strictly and daily washed, or oftener. In case of an epidemic it would be impossible to isolate completely any apartment, as the front door of each opens into this general pathway. The reply to these objections is that the care taken hitherto has prevented

* Societies are formed in many parishes to promote this object, and prizes are given for the best specimens of the most common flowers.

malaria from the water-closets, and no epidemics have as yet ever appeared in either of the houses, although at times diseases have prevailed extensively in the immediate neighborhoods. The attics are used, in common, as large washing, drying and bathing rooms. This community of goods in other places usually does not succeed well. Finally, I cannot think that the universal custom of leaving the brick walls and partitions uncovered, save by a white or colored wash, is agreeable to the eye, or can be so *homelike* as others covered with neat paper, &c.

In making these brief criticisms I trust that no one will deem that I undervalue the magnificent plan of the benefactor, or would throw the slightest shade upon the labors of the trustees. They are both beyond praise. But if any one in Massachusetts thinks of imitating this great act of benevolence, and seeks for light from these buildings, let him consider these points and compare them with the views of Sir Sydney Waterlow and Mr. Allen, which I shall give later in this letter.

I conversed long and freely with each superintendent of the Peabody Buildings. The resumé of the whole may be made as follows: Sickness is very rare. Epidemics have not raged inside, though, at times, prevalent immediately outside of the buildings. The general care of personal appearance of each tenant improves. This is remarkable, chiefly in the women and children. In some instances (as the superintendent at Shadwell remarked), the change in men is "wonderful; miraculous." A drunkard, slovenly and dirty; a husband, neglectful of wife and home, under the influence of the silent example of his neighbors in these buildings, and from his own growing self-respect, became careful of his person, and his evil habits of drunkenness left him. He was literally a man *renewed*. Many, from being quarrelsome when drunk, have, without giving up wholly their bad habits of drinking, learned to sufficiently restrain themselves as to become less offensive to family and neighbors. Knowing that, according to the strict rule laid down by the noble donor, no one will be allowed openly to be vicious, he hides the fault, and that is a great deal, at least for others even if it be less than one could wish for himself. The influence on children is almost constant. They may enter the buildings uncleanly and with torn garments. But they rarely

remain long so. Maternal pride and the stimulus applied to it by the desire of the child to appear as well and as neat as its playmates, work wonderful cures. There are some however who are incorrigibly wrong-doers and filthy, and some whose nature seems to need an occasional broil. An extremely dirty tenant, or "a weekly fight," said one of the superintendents, "I cannot allow, and I have had to discharge some, though very rarely, for their filth or their brutality." Discharges for nonpayment become less and less frequent. The sense of independence on the part of the occupants is often most ludicrously shown. Some refuse even favors, such as the purchase of coal at wholesale prices through the intervention of the superintendent, preferring to buy according to their "own sweet wills," even if they pay higher!

One superintendent informed me that very absurd stories were propagated about the rules and regulations of the buildings when first opened. It was currently asserted that every one must give up a little of his manliness if he entered as a tenant. Hence, perhaps, has arisen such insane protests as that above described, instead of a *real* manliness of character.

The result of my whole examination has been that of great admiration. The influence of these buildings for good upon the health, physical and moral, of the people residing therein, is immense. They are like oases in the desert of miserable, dark and dirty abodes such as I saw among the separate residences of Whitechapel and of Radcliffe Row. They are immeasurably superior in every respect to the public lodging-houses so cared for by the police, and of which I have already given some account in my "Night Stroll with an Inspector of the Metropolitan Police." Wherever hereafter an inquirer may ask about ameliorating the dwellings of the poor, there will the name of George Peabody be mentioned with respect and love; for be it remembered that institutions managed as the Peabody Buildings, are almost purely philanthropic. The percentage for rents on the original outlays is so small that no capitalist would desire to employ his surplus funds without greater gain. We must look in other directions for plans and successful experiments in which philanthropy and capital join hands.*

Before closing wholly these remarks I cannot forbear repeat-

† See III. Reports of Improved Industrial Dwelling Company.

ing a remark made by one of the most eminent of London capitalists, one who perhaps more than all others has labored in this cause of raising the homes of the people. The remark was made to me when speaking of the Peabody Buildings : “ Excellent as they are, how much more good would have been done, and how many more families would have been placed in healthful homes if, instead of building these large and expensive tenements, the fund had, in part at least, been spent in the purchase of suitable sites which might have been let at such *low ground-rent* as to induce capitalists to build houses according to certain specifications to be laid down by the trustees.” The more I reflect on the subject the more reasonable seems this suggestion from the London capitalist.

MISS BURDETT COUTTS’S MARKET HOUSE, LODGING HOUSE, AND
READING ROOM AT COLUMBIA SQUARE.

I know of no place which displays more the union of fine taste, with philanthropic zeal and Christian feeling, than these grand works erected by Miss Burdett Coutts for the people resident near Columbia Square. Columbia Square seems exactly the spot for such a series of institutions. In my walk to it I passed through streets filled with houses of an inferior kind, and out of which flocked troops of lively children, who evidently were born in the most humble life. Many of these legions of children seemed to be checked by their hard fate in some of the sweetest attributes of childhood. They were often thin and rarely clean, and although on many of the countenances was the peculiar bloom of young English life, the average of physical health was far less than would have appeared in any similar number of children growing up under happier auspices. Hence it seemed that Miss Coutts had wisely selected the spot for her philanthropic object.

The market-house covers a large open square, and is entered by various gothic arches of medium height. Small shops, and an inn (over the front of which appears an inscription to the memory of Sir Francis Burdett), occupy the basements of the quadrangle. In the open space of the quadrangle, at certain parts of the day, congregate the buyers and sellers. Over the various arches, and cut in the stone, appear mottoes, some of them taken from the Bible, and all appropriate for the place, and to be

plainly read by all ; for example, " The earth is the Lord's and fulness thereof, the world and they that dwell therein ;" " Speak every man truth with his neighbor ;" " Study to be quiet and do your own business ;" " A false balance is an abomination unto the Lord, but a just weight is his delight." The " practical" man may doubt about the value of these mottoes ; the sceptic may sneer ; the positivist complain of them as savoring of what he calls a bygone superstition—and finally the capitalist, as he wants to make money, would exclude the whole of them, and with them perhaps all the other graces that abound in the building, on the ground that they do not " pay." Nevertheless, I honor the filial piety, the æsthetic taste and the generous philanthropy that led Miss Coutts thus to shower, as it were, beauty and holy thoughts over the common ways and actions of the people and of their children. When that gentle lady is no more, thousands of hearts will bless her for the sweet impressions daily given them in their childhood and youth by the market walls of Columbia Square.

Adjacent to the square is a large hall, two stories in height, but really only one hall with four galleries, two on each side. Round tables are in each, and the newspapers of the day are there. One halfpenny is charged for entrance into this almost palace-like hall, with its polished granite columns, and, in summer, with its baskets of blooming flowers, its brilliant gas, and its numerous conveniences for reading, writing, playing chess, chequers, cards, eating, and even, in one portion, for smoking. I went into it and found most of the news I should have read at a club house. A number of persons were in each compartment. I regret to say that such a place evidently could not " pay." Nevertheless, it attracts by its cheapness and quiet, and prevents some, perhaps, from resorting to the dram shop, where, heretofore alone, the poor have been obliged to go for relaxation from daily toil. Therefore I hail it as one of the prophecies for the future health, moral and physical, of the people.

Directly behind the market and reading room, stands the lodge or home for the people.

It consists of a rectangular block of four handsome brick buildings, finished with stone. A very graceful clock-tower rises in the middle, which is surrounded by a small flower garden, the whole producing a very picturesque appearance.

The houses are built much on the plan of the Peabody Buildings, and should receive the same commendation and the same criticisms. I observed that the blue-tinted bricks of the walls look more pleasantly in the rooms than the plain white or lighter colors. The superintendent reports the same results as in the Peabody Buildings about freedom from epidemics and the improvement in the deportment of the inmates. He has known cases of intoxication radically cured after residence there. There is an evening school connected with it, and lectures are frequently delivered in the hall adjacent to the market. His rules for cleanliness are to brush out daily, wash up weekly, coloring of walls every three or four years. The prices range as follows :—

For one room,	.	.	.	.	2s. per week.
two rooms,	.	.	.	.	2s. 6d. or 3s. 6d.
three “	.	.	.	.	3s. 6d. or 4s. or 4s. 6d.
four “	.	.	.	.	4s. 3d. or 4s. 6d.
five “	.	.	.	.	5s. 6d.

He receives any one who applies, but first examines his actual residence and gets references. It differs in general principles from the Peabody Building chiefly only in receiving those as tenants who may earn more than 30s. per week, above which the latter does not go for tenants.

III.

“THE IMPROVED INDUSTRIAL DWELLING COMPANY,” OR THE
UNION OF PHILANTHROPY WITH CAPITAL, AND WITH
PERFECTLY SUCCESSFUL RESULT TO BOTH PARTIES.

A thorough insight into the operations of this company is all-important for all who desire to know how to erect good homes for the people. In Boston, the experiment has been successfully tried on a small scale. Two or three model lodging houses

have been built, and have done good to a few families, and at the same time they have returned six per cent. interest on capital over and above all incidental expenses. But nothing has ever been carried out on so grand a scale as by the above named company in London.

Whilst the Peabody and the Columbia Square Buildings do not pretend to pay more than the smallest return to capital, the buildings of the Industrial Company give such ample returns that the directors have refused (because so fully occupied with erecting new buildings) to receive more money for the present year. While the former cannot give an entire home and separate water-closets, washing-room, &c., to each family, the latter have contrived to do so, though at a somewhat higher rent. Nay, it is one of the cardinal ideas of the prominent workers of this company, not only to provide such a home, but to so arrange it that the parents shall always have a chamber, and that the sexes shall be entirely apart among children. Moreover, the buildings are so planned that every room or bed-chamber may be exposed to the open air, and shall not open into long corridors flanked by water closets at either extremity, as in the Peabody and Coutts Buildings. All of these arrangements of the "Waterlow" Buildings are infinitely superior, in a sanitary point of view, to arrangements for the same purpose found in the other two. Previous to the rising of this company, some unsuccessful experiments had been made to unite these two apparently hostile elements, capital and philanthropy.

During my night walk with the police inspector, and in one of the most filthy streets I passed through, I saw a dirty-looking, two-storied brick building, planned differently from all adjacent to it, and somewhat in the form of the model lodging houses of the present day. The windows and steps were unswept, some of the glasses were broken, and it bore all the marks of being inhabited by a rude, careless set. No flowers bloomed from its window sills; the steps leading to it were rickety, and the fence near it had that zigzag appearance so significant of a drunkard's home. There was an entire want of thrift about the whole premises. "There," said my guide, "is a model lodging house, built from a most benevolent desire to raise the miserable, and at the same time to get some return for capital,—you see how it looks now,—the poor man who built it failed in his

undertaking." To my inquiries, our guide gave the following further history: "It was originally built rather extravagantly by one full of benevolence, but of little practical experience. It stood in the very midst of an abandoned community. Hence, no one that was respectable would occupy it. The owner had not the ability or wish to collect his own rents;* consequently, great arrearages were allowed to accumulate. Finally, in despair, he leased it to another, with the idea of his sub-letting the tenements. The lessee was a man of no principle, and soon, to his horror, our philanthropist found that what he had erected for the improvement of the neighborhood was its curse,—it became the most elegant brothel of the street. Of course all this was stopped, but it was too late, the house never recovered from this blow to its reputation." Truly here was a monument suggestive of reflections of no very pleasant nature. These reflections, however, were amply replied to by the results accruing from the Industrial Dwelling Company's operations, and still more agreeably and forcibly met by the "Organized Work among the Poor," originated and so successfully carried on by Miss Octavia Hill of London.†

Again, previously to the rising of the Industrial Dwelling Company, another company had been formed. This was called the Metropolitan. It arose from the idea first brought out by that most excellent, as well as exalted person, the late Prince Consort, who proposed it at the First World's International Exhibition, viz., in his "Model Lodging House." The company arose very soon after this exhibition, and under that stimulus; but it failed to bring more than $1\frac{1}{2}$ to 2 per cent. It gradually drooped and settled up its affairs as a comparative, if not a real, failure. Although its operations were more successful than its predecessor's, it failed of getting what moneyed men deemed a good return for their capital employed. Of course capital shrunk from philanthropy, and philanthropy without these "sinews" became weak.

At length the two leading spirits of the Improved Industrial Company that has accomplished this complete union, met;—employer and employed, each a genius in his own department.

* Possibly, if this gentleman had had the tact and wisdom evinced by Miss Hill, he would have succeeded in his kind undertaking. See section entitled "Organized Work among the Poor."

† See Statement V.

The able financier, the wealthy humane man, one of broad, generous views, and of a good common sense, the head of a large printing establishment, alderman of the city of London, Sir Sydney Waterlow, agreed to advance money to the practical mason, Mr. Allen. This mason labored with his hands, but his heart was full of good will to the poor, among whom he was born and had lived nearly half a century. He saw them daily everywhere around him suffering for want of "good, *healthy* and *tasteful* homes." His head became full of plans for the erection of buildings for that desirable object. He knew all the dire wants of the case, for he had grown up under the same pressure. Hitherto the home of the workingman has been neglected; "consequently," remarked Mr. Allen, "he has resorted to the tap-room, where alone he has found brightness and mirth." Fortunately, Mr. Allen was brought into relations with the rich capitalist above alluded to, who had employed him as a mason, and with him he urged his plea. Sir Sydney Waterlow listened with attention and interest, and with three other friends agreed to advance the means upon the plan suggested by Mr. Allen, provided, on its examination by an accomplished architect, it should be found to be according to strict legal and architectural principles, so as to give safety to every room and individual in it. The result was favorable, and from that time to this, viz., from 1863, Sir Sydney with others, forming a limited company, have continued to build and to extend their operations, Mr. Allen remaining as their architect and chief superintendent.

This company was originated in the above named year, and made its first half yearly report in 1864. Sir Sydney has been its chairman and mainspring since its origin, and to the vigor, fine spirit and practical sense of these two men, with ample means at their disposal, it doubtless owes its perfect success. The following extracts from the remarks of Mr. Goshen, Member of Parliament, at the 7th half yearly meeting held at the Mansion House, February 14, 1867, may be quoted. He said that he felt "that the Company was not only one of great private interest, but also of great public importance;" and that "the greater the extent to which the principle could be carried, the better we should be able to solve the great problem as to how our laboring classes are to be accommodated." "It has

been asserted that when a low class of houses are pulled down, and new buildings replete with all the improved sanitary arrangements are erected in their stead, it can only be done at a loss. I consider that it is the object of this company to disprove that assertion, and to show that good buildings can be erected in the place of bad ones at a profit instead of at a loss.” “A profitable business can be done if sites are judiciously selected.” Some of the speakers alluded, as capitalists, to their gratification at the fact of the good return for the money invested. One regretted that the houses were not for the very poor laborer, but rather for the common mechanic. To which reply was made that, if the artisan leaves his present home the laborer will move into it, and thus both be improved in condition.

The directors in their report say, “during the previous four half years dividends of five per cent. had been paid, and a sum equal to 25 per cent. of the net profit was carried to a reserve fund.” The directors believe that, from their previous experience, there was a fair prospect of an annual profit of at least six per cent., after making liberal allowance for contingent expenses.

The following appears in the Fourteenth Half-Yearly Report made at a meeting held at the Mansion House, June 12, 1870.

The whole of the share capital, viz., £125,000, has been subscribed, and a further sum will be borrowed at 4 per cent. from the Public Work Loan Commissioners, which will represent a total capital of £250,000. The company had generally houses well occupied, except at Greenwich where, owing to the depression of trade in that locality, they suffered as the Peabody Buildings at Shadwell had, viz., from a loss of tenants.

The estates of the company, with number of tenements in each, are as follows:—

	TENEMENTS.				
	3 Rooms.	2 Rooms.	1 Room.	Shop.	Total.
Cobden Buildings, King's Cross Road,	8	10	—	2	20
Nelson Buildings, Bridge Street, Greenwich,	20	20	—	—	40
Tower Buildings, Brew House Lane, High Street, Wapping,	30	30	—	—	60
Stanley Buildings, Old Saint Pancras Road, King's Cross,	51	50	—	3	104
Palmerston Buildings, City Garden Row, City Road,	36	36	—	—	72
Cromwell Buildings, Red Cross St., Southwark,	10	12	—	2	24
Derby Buildings, Britannia St. and Wicklow St., King's Cross Road,	40	118	—	10	168
Gladstone Buildings, Willow St., Finsbury,	84	84	—	—	168
Waterlow Buildings, Bethnal Green Estate,	21	48	3	—	72
Total completed,	300	408	3	17	728
Buildings in course of erection at Ebury Street,	50	60	—	10	120
Buildings in course of erection at Ebury Square,	40	25	—	4	69
Buildings in course of erection at Bethnal Green,	40	130	—	—	170
Total either erected or being erected,	430	623	3	31	1,087

With exception of 72 tenements in the Derby Buildings, where one scullery and copper, &c., are provided for every three dwellings, each tenement has a separate wash-room, copper for heating water, water supply and other conveniences, the cost of which is about equal to that of a room.

The methods pursued in raising the funded capital is as follows. I quote from the prospectus issued in the year 1867 :—

“Capital £250,000, of which £65,000 were then subscribed. Shares £25 each, £5 to be paid on allotment and the remainder in calls of not more than £5 per share, at intervals of not less than three months.

“A bill has been recently passed which will enable the company to largely increase the extent of its operations, by borrowing of the

government at 4 per cent. interest, a sum equal to the outlay on its buildings. A profit of £5 1s. per cent. interest (being nearly one per cent. less than the estimated annual profit) will be sufficient to repay both *principal and interest* of the loan at 4 per cent., from which it will follow: (1st.) That the saving of nearly one per cent. on the borrowed portion will increase the profit on the shareholders' part of the capital to seven per cent.; and (2d), that at the expiration of forty years (during which the loan is current), the unencumbered reversion to the buildings created by the investment of the borrowed money, will double the value of the company's estate. This anticipation, too, is irrespective of the ordinary progressive increase in the value of landed property. Houses in some districts of London double in value in the course of a few years.

“The evils of great towns spring almost entirely from overcrowded and ill-constructed dwellings, and no permanent benefit can be conferred on the working classes until this, the primary evil, is removed.”

Of the buildings mentioned above, I visited the Cobden, Derby, Stanley, Cromwell, Gladstone and Tower. I also examined a new block erecting at the expense of Mr. Allen, and called by his name. They all have the same general appearance, excepting that the Derby has a less imposing aspect than the rest. The others present a very neat appearance, not to use a higher epithet, built as they are of brick and manufactured stone, with stone finishings and steps, and iron balustrades on each. Everything I saw looked very clean, and the superintendents assured me that the same general results as to health and morals followed in their train, as noticed in the Peabody and Coutts Buildings. Tenants dislike to leave, and if trade for a time compels them to leave, they gladly return. The sole objection is that above alluded to, viz.: that the rents necessarily are a little higher than most of the *very* poorest can pay, averaging about twice as much as is asked in the Peabody Buildings, while giving many more conveniences and an *entire home to each family*. The following table shows the rents per week for some of the buildings and gives an idea of the whole:—

BUILDINGS.	Four Rooms, Kitchen, &c.	Three Rooms, Kitchen, &c.	Two Rooms, Kitchen, &c.	One Room, Kitchen, &c.	No. of Fam- lies.
Derby, .	-	7s. 6d. ; at top, 5s. 9d.	7s. 3d. ; at top, 5s. 5d.	-	168
Cobden, .	-	7s. ; 4th story, 6s. 6d.	5s. 6d. ; 4th story, 5s.	-	-
Stanley, .	-	7s. ; at top, 5s. 6d.	6s. 6d. , at top, 5s.*	-	101
Allen, .	9s.	- -	5s. 6d. ; 6s. 6d.	4s.	70

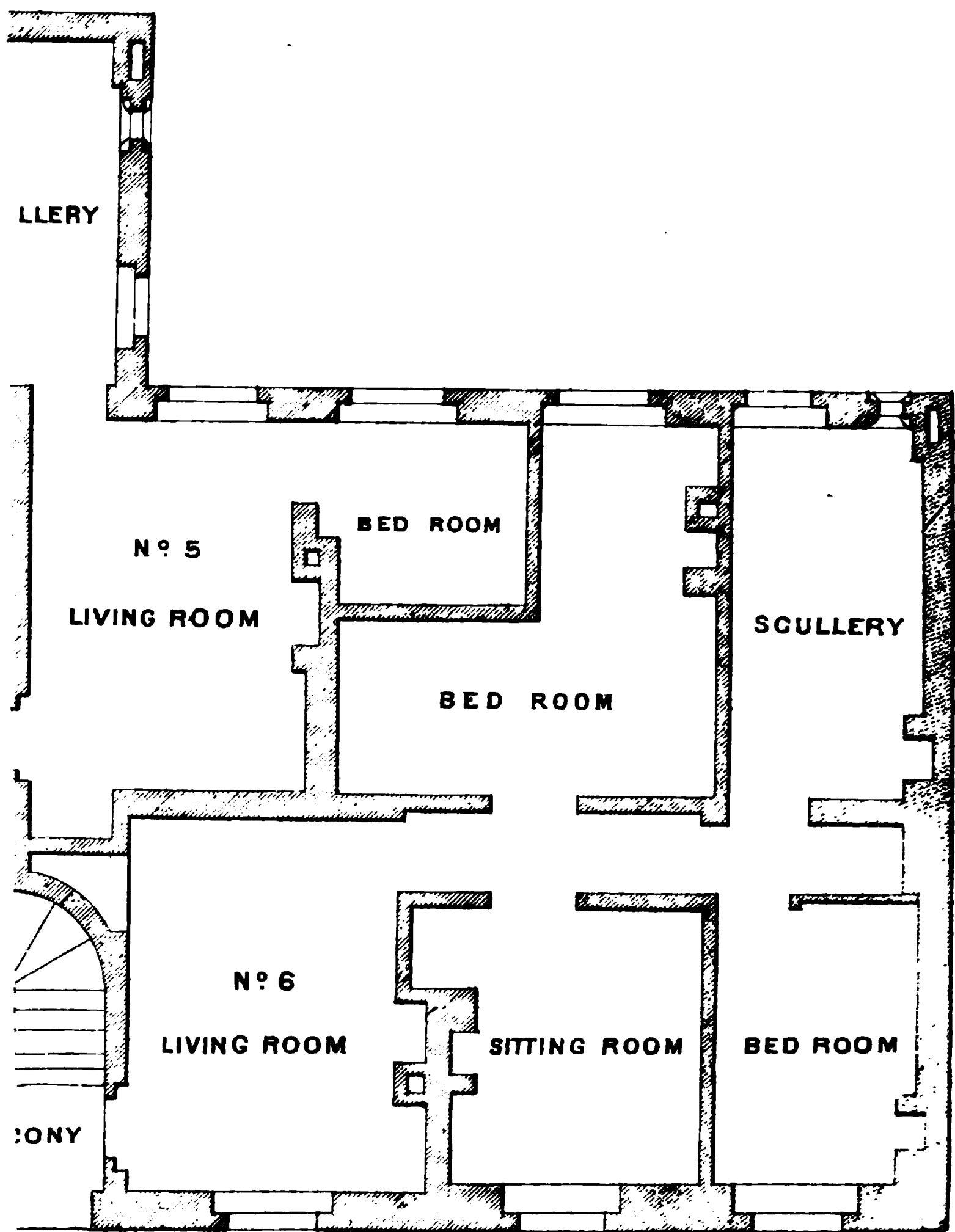
* With two bed closets.

In the building now erecting at Bethnal Green, one room only is provided. We cannot but hope that this also will prove a success, even at a lower rate. Nevertheless, considering the very perfect houses, thus provided with two, three or more rooms and all their addenda, and this within very short distances from the workman's place of labor, we cannot call the rents high.

Of course it was important to see and converse with the men most interested in this great, this growing and most successful company, whether we consider it in the light of the investment of capital or as a matter of sanitary reform, destined to exert immense influence on the future health of the English people. These interviews I sought. They only convinced me more than ever of the philanthropic views and the wisdom and far-reaching sagacity of Sir Sydney Waterlow and of his able assistant, Mr. Allen. "I build for the future," said the latter to me on one occasion. "I have lived and toiled among the working men of London over forty years, and I know their necessities and their desires. They have been all that while steadily but slowly improving. I feel sure that sometime after I am dead, every mechanic will live in such buildings as we are now erecting. Each one will have his own neat, tasteful home." Mr. Allen believes in cultivating the æsthetic part of the nature of man. A well-trained flower on the window sill reveals to him humanity somewhat more developed and a better tenant to be chosen for his newly-built houses, than when he finds neglect in this particular. Yet this man is a workman

BURY, LONDON.

· Mr.Allen & finished Sept.1870.



and uses his trowel if need be and dresses as a workman should when at his daily labor. Sir Sydney is the complement of him, a philanthropic financier, with ample means and full of enthusiasm for the ideas underlying their great mutual undertaking. Sir Sydney considers the company as equally a fine success as a sanitary measure and as an investment for capital. Everything is conducted on the most rigid economy; no salaries are given. Mr. Allen, who has already amassed a sufficient sum to enable him to build a block of buildings on his own account, assures me that the company never makes less than twelve per cent. He expects to make that with his own at the prices above named, and all the rooms are engaged before the house is finished.

On the plan herewith given, are seen the arrangements of six tenements or one-half of one story of "Allen's Building" near Finsbury Square. It is the latest tenement erected by Mr. Allen, and was opened in September, 1870. The building is of brick, with stone finishing. It is five stories high. The rooms are eight and a half feet high from floor to ceiling. The front is about one hundred feet on the street. Its depth is a little over forty feet. The central part of the front line is set back a short distance, and has four bay windows on each story. The two end portions present, therefore, the appearance of wings added on each side of a more elaborately constructed centre. The structure has a certain degree of elegance and refinement about its exterior, which would make it not inappropriate for any of the fashionable streets of the metropolis. Yet it is filled wholly with a series of small tenements, very convenient and perfectly lighted and ventilated, the homes of some of the humblest of the people of London. These homes are constantly occupied. The site of the building is directly opposite a wretched, low tenement house analogous to the "Crystal Palace" in Lincoln Street, Boston. Mr. Allen feels sure, from his previous experience of the influence of the Waterlow Buildings, that the silent example of his house will tend to elevate the character of its opposite neighbor.

Sir Sydney and Mr. Allen were both very earnest about their system of ventilation, which gives free access of the air to every room, and allows, when two or three doors are opened, a free circulation of air through the whole house. They both

disapproved of the long corridors, and a community of water-closets flanking them, as in the Peabody, Coutts and other buildings. Mr. Allen spoke very decidedly on this point, and said that he thought fifty years hence all buildings constructed with such corridors would be among the past, and either wholly re-organized or occupied by a degraded set of tenants. Whether such prophecies will prove true remains to be seen. Meanwhile, there is no doubt on which side the sanitarian observer would stand on this question, for unless great and persistent care be daily taken, evil will sometimes result in the corridor water-closet system.

IV.

JARROW BUILDING COMPANY.

From the preceding statements it will be seen that a great step forward has been successfully taken in London. It has been proved that capitalists can safely pull down poor houses which are unfit for human dwellings and which tend to propagate ill health, crime and vice, and instead of these pests can build up healthful and tasteful homes for the people, and while thus doing they can gain money for themselves, and by the same act raise the human race to a higher grade of physical and moral health. This idea is springing up in various other parts of England. Everywhere men and women are thinking upon the subject. I happened to be at Newcastle-on-Tyne, and found there some buildings just erected in that city. At Jarrow-on-the-Tyne I visited some of the small tenements built under the direction, and at the expense of the Jarrow Building Company. These arose at first from a desire on the part of a large iron ship building company to provide proper tenements for its own workmen. The company has been in existence since 1868, and very successful too have been its operations. These operations consist in putting up separate small buildings on land large enough to give a small yard to each. The build-

ings are two stories high, have two and sometimes three rooms, with washhouse, &c., to each. They form long streets, which are broad and well paved, and have neat sidewalks on both sides.

On taking possession of any premises with the intention of eventually purchasing it, the tenant signs the following agreement with the trustees of the company, viz.: to pay annually ten per cent. of the price named; viz.: five per cent. for the rent and five per cent. towards the price of the estate; such payments to be made in fortnightly instalments; that if he fail to make such fortnightly instalment he shall be fined 3*d.*, if a second time 6*d.*, a third time 9*d.*, and so on; that if at any time such fines amount to the sum already paid by the tenant, the trustees are to have the right to enter and hold the premises, as if nothing had been paid, and to eject the tenant; that possession shall be given after signing of the agreement, but that a full deed shall not be demanded until three months after the final payment, when the trustees agree to give such deed, the tenant paying the necessary expenses; that the tenant must keep the premises in good order and shall not sell them without permission from the trustees.

The above summary gives an idea of the nature of the transactions between the trustees and tenants at Jarrow. I examined the houses and found them neat and simple homes, and learned that the affair had been quite successful, and that, one after the other, each workman was becoming a proprietor of his own place of residence. The stimulus thus given to every individual mind among the workmen has been very beneficial. It had also proved an excellent sanitary measure.

V.

ORGANIZED WORK AMONG THE POOR.

In all that precedes we have found it needful to have either vast police authority, great private benevolence, or finally a combination of philanthropic effort with capital, in order to raise to a proper healthful standing the homes of the poor and of the laboring population.

We now come to consider perhaps the most interesting, as certainly it is the most extraordinary experiment of all yet instituted, viz.: what Miss Octavia Hill, the originator of it calls "organized work among the poor." It shows what a single individual can do if one only will act with patience, perfect self-control and wisdom and, if need be, self-sacrifice in a good cause. By these qualities, and with very little money, Miss Hill has succeeded in conquering difficulties seemingly, at first sight, insuperable. She has herself explained her methods in the "Fortnightly Review" for Nov., 1866, and in "McMillan's Magazine" for July, 1869, and more recently in a private way, at the request of Mr. Wilkinson, she drew up a statement which she has kindly had copied for my use, and the greater part of which I will here present. It tersely tells the story of what *has been* done. Later in this paper I will describe her usual method in more detail:—

MISS HILL'S STATEMENT, JULY, 1870.*

"The main principle on which the following experiment was founded, is that personal influence is the lever by which the poor can be raised; that this is exercised better by those who stand in some recognized relation to them, such as that of landlord.

* A short time before I left London in November, Miss H. informed me that she had given the paper for publication elsewhere.

“The first property, three houses of six rooms each, was bought in 1864 for £828. It was leasehold with an unexpired term of fifty-six years. It has paid five per cent. from the day of purchase on the capital invested. It has repaid a portion of the capital: a further sum of £40 has accumulated from the profits, which sum, Mr. Ruskin, the proprietor, wishes to devote to benevolent purposes. It has also paid for building a room for social gatherings. These sums have been realized after providing for the repair and continuous improvements of the property. The second purchase was a freehold consisting of land, on which stood five houses of four rooms each, and one of fourteen rooms, and some old cowsheds. It was bought in 1866, and cost £2,725. The cowsheds were demolished, and the space used as a playground for the neighborhood. An additional floor has been added to the houses, making forty-five rooms in all. This property has realized five per cent. also, and considerable sums for repairs and improvements.

“Encouraged by the result of the experiment, Mrs. Stopford Brooke last autumn bought the leasehold of five houses in Barnett's Court. Each house contains ten rooms; these also have paid five per cent., and already begin to pay the capital. Lady Ducie last Christmas bought the leasehold of six houses in the same Court. They also promise to pay well.

“Another lady has purchased a plot of freehold ground in the poorest district in Marylebone. A sum of £2,000 for building on it has been contributed by four ladies, and the plans are in preparation.

“In all these instances a marked change has taken place in the manners, habits and morals of the tenants, who in most cases are the same as were in the houses at the time of purchase. The rents have been rigidly exacted, and perhaps the sense of fulfilment of a duty has much contributed to raise the spirit and tone of the people.

“In keeping such houses in repair a great deal of carpentering, plastering, white-washing, and other rough work has to be done. In times of scarcity of work this forms a valuable means of giving employment, thereby assisting, without demoralizing the poor. Great care should be directed to supervising the cleanliness of the houses. Health more often depends on the way the house is kept than in its construction and appliances. The reckless destructiveness of this class of people has been greatly cured by setting aside a fixed sum for repairs and improvements, of which an account is rendered quarterly to each tenant, and if there is a surplus the tenants in turn decide how it shall be spent in improvements.

“In times of want *no* charity has been given, but work has when possible been found. The amusements of the tenants have been provided for as far as possible. Excursions in the country; social meetings in winter, concerts, &c., have been arranged, and have brought into more friendly contact the tenants, and those interested in them.”

It is evident, from the above account, that the plan succeeded because Miss Hill, an intelligent, well-educated lady, fully appreciated not only the difficult and delicate relations of landlord and tenant under such circumstances, but knew moreover the influence she could exert for good over rougher and less cultivated natures.

I sought an introduction to Miss Hill, and I had long conversations with her. I had previously visited one of her houses. Her lady-like self-possession, and accurate and prompt ways command the respect of every one who comes in contact with her. One feels that there is no sentimental nonsense about her, but a downright honest and clear way of looking at unpleasant circumstances, and an unswerving determination to carry out what she deems a simple duty. This duty would be to most people very irksome, nay, in many respects absolutely repulsive. Few would undertake it, because of this essentially disagreeable nature. What she has undertaken and has accomplished, most people would say was entirely “out of woman’s sphere.” I cannot present her plan to the Americans in any better way than by the following hypothesis:—

Suppose any lady in New York or Boston should say: I will buy the worst den at Five Points or in North Street, even if inhabited by cut-throats and garroters. I will become their landlady. I will call personally every week for my rent, and rigidly require it; I will give no charity, but will if possible provide work; I will enlist their sympathies by being myself interested in their welfare. If they are ill I will try to comfort them; if they are uncleanly, I will try indirectly to make them cleaner. I will occasionally induce the parents to bring the children out into the Central Park, or into the Public Garden, in order that they may feel the beauty of flowers, and may taste the sweet freshness of the pure air. I will try to open their eyes to all the fair things of art. Miss Hill has not only

proposed, but has actually done all this.* She has taken charge of houses in most wretched and low neighborhoods, in one of which the previous landlord had been a drunkard, and his tenants had copied his example. The filth of this place was extreme. The yard and wash-house were choked up with the nasty accumulation of years, so that it was impossible to use either, and therefore they had been definitely closed for some time. Very many of the windows of the various rooms were broken and filled up with old clothing. No paint had touched the house for a great while. The tenants were a wild, swearing, destroying race. Miss Hill gave notice to them of the change of landlords; told them she should simply clean up the house and repair some of the broken parts; that she wanted them to aid her by treating the premises properly; that she should ask for the rent previously demanded; that it must be promptly paid weekly, and that neglect of that bounden duty for two weeks would produce a legal summons to quit the premises.

At first no good result seemed to arise, as the next time she went she found even the new places injured, and at times wantonly broken. She said that she hoped such a result would not happen again, and that she had made up her mind to spend upon the house a certain sum annually for repairs or improvements, if actual repairs were not needed; that she should charge each tenant with whatever injury was found in his or her room. Of course, therefore, they would see that the better care they took the more would be left for the general improvement of the premises. Upon the precise method of expenditure to be made with the saved funds, she should consult the tenants each in turn, and perhaps follow his or her counsel. The result was all that could be desired. The manners of all improved. Instead of vieing with one another how things could be injured the emulation was to save as much as possible. Each tenant has tried to improve his own premises. The savings thus accruing have enabled the landlady to add a new story to the house, and to introduce an ample water supply. A playground for the children, and pleasant shady space for elders has been opened in front of the building. Trees are growing where formerly were dirty sheds, and green vines climb over walls formerly be-

* Since writing this I have heard of one similar undertaking by a young lady in Boston.

smearred with filth. The men have more self-respect, the women are more cleanly, the children are better clothed, and go more regularly to school.

Similar results have taken place in another dilapidated, doorless house, "a perfect rat-hole."

The previous landlord had been garroted and nearly killed on demanding his rent. Mr. Ruskin, though aiding with pecuniary means, deemed it almost hopeless even to attempt to do anything with such a place. But Miss H. succeeded. I asked to be allowed to go around with Miss Hill when she collected her rents, and she permitted me to do so. Into every tenement she went she quietly asked for her dues, but had some word to say about the family. The smiling and bright answers she got from almost all showed how different the relations must be between her and her tenants, than those which had existed between them and her predecessor. In one dark and dirty alley, however, I anticipated evil and rough treatment, for the agent informed Miss Hill that one of the tenants had sworn he would not submit to a summons that had been served upon him, to quit for non-payment of rent. We went our rounds, however, as if no remark had been made. We found the house in rather a poor condition. As it had been only recently taken in charge, there was some want of neatness about the stairs, &c. Miss Hill remarked upon it and added, "*we have to educate ourselves to wait in hope. We cannot make them suddenly clean. For three weeks I have been trying to induce them to properly wash that window. It is, as you see, still dirty. They will, however, learn by and by.*"

At length we arrived at the upper part of the house, and entered a very low room, evidently inhabited by drunkards. Everything was disorderly and comfortless. A sulky, rough man, and a bloated-looking woman, his wife, were there.

Miss H. merely said, "Mr. ———, I learn that you decline receiving the summons. You will understand that it has been legally served, and if the rent be not paid next week, you *must* leave." He answered very doggedly, and *pounded furiously* upon the *shoe* he was mending, possibly to overcome the inclination he had to lay violent hands on his landlady. He was well enough able to work if he chose to do so, and could also pay his rent if he would not drink. This man was the

ruffian about whom we had been warned. A low muttering from husband and wife was the only reply, as we turned to leave the room.*

The whole visit was a very valuable one. It showed that the qualities named in the earlier part of these remarks were all that were needed. The last house I have no doubt will be redeemed and the tenants raised morally, as in the others alluded to, and disease, too, will strike them less generally under the mental, moral and physical cleansings that have been inaugurated.

I may mention as a proper finale to this whole story, that Miss Hill, when speaking of the gradual education of her tenants, remarked "that some of the lowest had so far risen in self-respect, and their means of support having consequently perhaps increased, they wished to get into higher and better rooms, out of their old pathways!" She had encouraged them to do so. In fact, she is now beginning to arrange a better class of houses, just above the level of these lowest dens, and hopes that she shall win many up to them, even if they have more rent to pay out of their small earnings in order to gain that end.

SUMMARY OF THE WHOLE INVESTIGATIONS UPON SOME OF THE
MEANS NOW IN OPERATION IN ENGLAND FOR IMPROVING THE
HOMES OF THE PEOPLE, AND THE RESULTS OF THESE OPER-
ATIONS ON THE HEALTH AND MORALITY OF THE OCCUPANTS.

I have thus given five separate statements alluded to in the first portion of this letter. Although each can be read by itself, an important idea underlies and runs through the whole, viz.: that by improving the homes of the people; by making them neat and wholesome instead of filthy and stinking, we raise men, women and children to a higher standard of physical and moral health. The *first* paper entitled a "Night Stroll, &c.," proves that *English law* jealously guards the *public lodging houses* of the poor and vicious. It prescribes rigid rules in regard to cleanliness, amount of air, water, &c., for each lodger. At the same time the same law allows the *private*

*About three months after this interview, I asked Miss Hill what became of her rough tenant. "Oh," replied she, "he did very well. He forthwith paid his rent, and I have had no further trouble from him."

houses of the miserable and degraded of the same class to become by their filth, moral and physical pests of the neighborhood in vast districts in London. As an addendum to this paper, I have given another by which Boston seems to vie with London in its low tenements, and in disregard for sanitary law it is perhaps superior to the English metropolis.

Second. I have briefly described the Peabody and Burdett Coutts Buildings. I have given them as illustrations of philanthropy, and of its effects upon the dwellings of the laborers, and their results upon the health and morals of the people.

Third. I have shown in my notice of the operations of the operations of the "Improved Industrial Dwelling Company," how philanthropy and capital can join hands and each reap an ample return for its efforts made and for means given.

Fourth. I have indicated the workings of the Jarrow Building Company, in which the tenant, besides gaining all the advantages afforded by the preceding methods, is stimulated to become himself the proprietor of his own home.

Fifth. I have described the extraordinary and yet simple labors of Miss Hill, aided by the well known writer on art, Mr. Ruskin, Rev. Stopford Brooke, &c. By these labors the vilest dens of London have been reformed to neatness and morality, by the personal influence of the individuals engaged in the matter, while at the same time the relations of landlord and tenant have been rigidly enforced, all money-giving charity has been virtually abolished, and with all this there has been an ample return for capital invested.

VI.

COMPARISON OF THE COMPARATIVE VALUES OF A MODEL LODGING HOUSE AND COMMON TENEMENT BUILDING IN BOSTON.

In the last year's report of your Board, you regretted that it was impossible to finish the account of the "Comparison of model lodging houses and common tenement houses, in their

relative effects upon the health and morals of the people." Though signed by the whole Board, the final statement really devolved upon myself, who had commenced the investigation.

Circumstances beyond my control compelled me very soon afterward to leave America, and I have been unable to make out a final report till within the past week, which renders it less complete than I could wish. I should regret this very much if I had not been able during my enforced absence to make the preceding investigations, which I deem, and I hope the Board will consider, not only not irrelevant, but rather, as it were, adding to the foundation of the practical results of our last year's investigations in Boston. To these results I propose now to draw your attention.

A thorough examination was made by Dr. A. L. Haskins, under the direction of the Board, and according to a certain definite plan of questions, at each particular tenement in two houses, viz.: the model lodging houses in Osborn Place, and the so-called "Crystal Palace," a common tenement building in Lincoln Street. Replies believed to be accurate, or nearly so, were obtained from these two. Subsequently, buildings in Stone's Yard, in Cross and Stillman Streets, Institute Avenue, Endicott Street, and Friend Street Court were seen. All of these are of the lowest and most degraded class of buildings. From all these last the returns were rather imperfect. In one, the proprietor compelled the tenants to eject our agent.

MODEL LODGING HOUSE IN OSBORN PLACE, BOSTON.

The results obtained may be summarily stated as follows:

The model lodging house consisting really of three brick buildings, provides a residence for poor families. They contain all the appliances for comfort and health provided by modern society, at a cheap rate, and yet large enough to be amply remunerative to the proprietors.

It is situated on the original soil on a somewhat elevated part of the city, where the tides never reach. It is five stories high, built of brick; is of a very neat appearance. It has an ample supply of fresh air around it. It has a large common entry, and private entries for each family home. Each family has 3 or 4 rooms with windows in each. There are 182 persons in the building, 65 of whom are children. The basements are

used for storage, not for dwellings. The buildings are generally clean and sweet smelling, save when, by carelessness, offal is allowed to remain longer in the dust-bin than is proper. The families ventilate their rooms by frequent opening of the windows. Sunlight enters every room. An average of 931 cubic feet of air is provided for each occupant. Each family has its own water-closet, which is kept scrupulously clean. There are no "privies" on the place. Cleanliness and absence of unpleasant odors are manifest everywhere. The drainage is excellent. Each family has its own bath-room in one building. Two common bath-rooms are found in the basements of the two other buildings. Thrift, neatness, quiet, and orderly deportment prevail throughout. All the tenants praise the building; dislike to leave it except when necessity compels a change of residence. The result to the proprietors is a six per cent. investment and the payment of all expenses.

The birth-places of the tenants are as follows :—

United States,	.	.	.	.	.	.	42
Ireland,	.	.	.	.	.	.	1
Nova Scotia,	.	.	.	.	.	.	1
Newfoundland,	.	.	.	.	.	.	1
France,	.	.	.	.	.	.	1
Germany,	.	.	.	.	.	.	1
England,	.	.	.	.	.	.	2
							<hr/> 49

The health report is as follows :—

It was good before entrance,	.	48.98	per cent.
Improved since	"	24.44	"
Ill before and since	"	14.29	"
Ill since,	.	14.28	"

The death-rate is much less than the average death-rate of the city.

COMMON TENEMENT HOUSE, OR CRYSTAL PALACE, SO CALLED.

In striking contrast with this report let us now look at the aspect of the "Crystal Palace" in Lincoln Street. It is a large, filthy-looking building, with brick ends, but chiefly of wood.

Long open piazzas run in front and back of it at each story, upon which immediately open each sitting or living room. The ventilation depends upon the doors opening on these piazzas, and upon a small window adjacent, opening on the same. The bed-room, back of the sitting room, gets its only light and air from these two apertures.

Like the model lodging house, it returns a good percentage, but the rents are oppressively great. There are no modern appliances. The tides come up very near to the basement floor, but being built on made land no cellar exists. It is five stories in height. The air circulates freely around it, and the sun can reach some of the sitting rooms. It never penetrates any bed-rooms. There are sixty-two families. Each has only a sitting room and the dark bed-room above described. There are 295 persons in the building, 149 of whom are children. The basements are below the level of the street, and each family in them has four rooms, the bed-rooms being opened, and thus a passage is given through from the front to the back of the building. They are all damp, dark and dirty. Sunlight enters a little at the front door and window. Of cubic feet of air in the house we find only about one-third of what is found in the model lodging house for each tenant. No water-closets, but only a filthy privy in the yard is furnished the inmates. This privy was in a shockingly dirty state when our agent called; it was choked up. Odor from that and an obstructed urinal was very bad, even in November. No bath-room is found on the premises. Drunkenness and theft are not uncommon. None of the tenants praise the residence, though compelled to stay, owing to the cheap rents. Some were indifferent, and some even said they liked the place. The result to the proprietor is that he sub-lets to another who keeps a shop, and contrives to reap an ample reward, the exact amount being unknown. In other words, the house though so miserable in all its appointments, gives good returns of money to two persons from rent obtained.

The birth-places of the tenants by families are as follows :—

United States,	.	.	.	.	.	.	1
Ireland, .	.	.	.	.	.	.	60
Nova Scotia, .	.	.	.	.	.	.	1—62

The health report is as follows :—

Good before entrance,	67.74
Improved since entrance,	3.22
Ill before and since entrance,	9.67
Ill since entrance,	19.35

The death-rate presents some peculiar, not to say extraordinary results. Suffice it to say it was not so great as one would anticipate, save in the basements, where one-half of all the deaths occurred, and the death-rate there was higher than in the city at large. I forbear to give the few statistics obtained because further investigation on the point will be necessary.

REMARKS ON THE ABOVE STATEMENTS.

I might well leave these vivid contrasts between the two buildings to speak for themselves. Health, physical and moral, are the results of the model lodging house. Less physical disease and less mortality are noticed in some parts of the tenement house, than one would anticipate ; but intemperance and degradation of character are rife in them. From the former come neat, industrious, quiet, hard-working, temperate citizens and their wives and children. From the latter steal out some of our thieves, or stagger forth the reeling drunkards. Neatness of body and of dwelling is seen in Osborn Place. Beastliness of filth and noisome smells salute the senses in Lincoln Street. Sunlight, so bountifully shed upon every human being, is admitted to every room in the model lodging house. It is excluded, or but grudgingly admitted, in more than one-third of all the rooms of the low tenement, while into the bed-room, where the tender bodies of children spend more than half of their young lives, not a single ray can, by any possibility, enter. Ventilation is everywhere amply provided for in a manner appropriate to our climate, in the large entries, the windows in every room, and the ventilating shafts of the model lodging house. It is partially obtained in the tenement house only by opening the door or window in the living room, even in the depth of winter. This last fact, however, though, at first sight, it may seem a cruel exposure of a family, especially during the depth of our winter, is perhaps, a real blessing in disguise.

For the inmates, though exposed to bleak and sometimes to biting cold wind, gain by this frequent opening to the street of their single door a freer circulation of air, comparatively pure, than is given to some of those who live luxuriously in the stifling furnace-heated houses of fashionable quarters of the city.

Such are the general characteristics of the houses and of their occupants broadly considered. But it will be well to examine them a little more in detail, and in conclusion suggest certain obvious remedial measures that may be necessary, or at least allowable, in connection with the tenement buildings generally in the cities of Massachusetts. In this examination I will refer to various items given above.

No. 1. *Site of the house.*—There is no doubt that the site of the model lodging house upon the somewhat elevated native soil of the city is really better for the health of persons living there, than are many parts of the newly-made land composed of mud and filth of every kind, but on which some of the richest houses of our city now stand. Investigations in this country and in England have fully proved the fact that actual disease is more liable to occur in a house standing on a damp than on a dry soil. In choosing, therefore, hereafter, a site for a tenement house, we should not neglect this consideration, even if the effects of it be not strongly manifested in the present returns.

No. 3. The evil of using a basement for a residence is distinctly seen in these returns. The model lodging houses have well-lighted, dry, airy basements, legitimately used for storage. The low tenement house uses the basement for residences. It virtually slaughters human beings by so doing, the rate of mortality being very many times greater in the basement than in the rooms above it, and greater than that of the city at large. In the basement fever, diarrhoea, scrofula and consumption are liable to prevail, and if an epidemic occur, the dwellers in such a place are peculiarly exposed to its influence. The State should forbid any owner of a house to rent a basement. Proper inspectors should have authority to shut up such places as being dangerous to the public welfare. In fact, I think the law as it now stands, if enforced, could apply a remedy.

The comparative healthfulness of the two tenements is not so evident as one would have thought it would have been. But the advantages of the model lodging, and the disadvantages of its opponent can be clearly seen on a closer inspection. The returns from the model house may be deemed more accurate than those from the low tenement house, because, first, the character of the residents is higher, and second, there is always more willingness to tell of good qualities, than of the bad qualities of one's homestead. Making these deductions we can say: *First*, a smaller proportion of these entering the model lodging house were said to be perfectly healthy; but notwithstanding this, nearly one-fourth of all of them gained in health during their residence, whereas only a very small proportion in the tenement house said that they had gained in health. Of these latter, we may infer that the tenement house, poor as it was, was really superior in its hygienic influences to their previous residence. For, of these families, one had lost eight children by croup, lung fever and convulsions, and another five children within six years previous to their entrance into the tenement house.

Second. Five per cent. more fell ill at the low tenement house than at the model house.

Third. A severer form of acute and of chronic disease is found in the tenement house than in the model lodging house, as the following statement indicates:—

Diseases Reported.

In Model Lodging House.	In both.	In Low Tenement.
Effects of pregnancy. Congenital diseases. Debility.	Catarrh. Bronchial trouble. Whooping Cough. Rheumatism. Lung Disease. Diarrhœa. Scarlet Fever. Measles.	Rheumatism. Typhoid Fever. Conjunctivitis. Bright's Disease. Children in poor health.

It may be remarked, moreover, that from the results obtained from Boston during the cholera, and other epidemics, and also from London and other large cities, the filthy state of the low tenement house, is just the condition upon which these, sometimes rapidly fatal, diseases seize with awful violence. Such places thus become real food for contagious influences, nuisances to all in the vicinity.

In comparing the number of deaths in the two residences results different from what were anticipated, have been arrived at. The question will arise whether there may not be some error in the returns. The only answer that we can make is that Dr. Haskins recorded carefully, and believed he got the truth. Even during the investigation he was surprised not to find greater discrepancies in the mortality, as reported by the occupants of the two houses, apparently so different. Nevertheless, there is a difference, and the model lodging house holds its preëminence over its rival, and over the city at large. Probably the fact that air circulates freely about this particular low tenement house, the "Crystal Palace," and that other fact already referred to, viz., that every time the door of the living room is opened the inmates have access to this air from the street, may so improve this filthy place that people live there perhaps in spite of, what usually are deemed, very pernicious influences.

It would seem, however, that there may be some deleterious power or powers at work in the community at large, upon the rich as much as the poor, that must raise the death-rate for the city at large. I would suggest the following considerations as bearing materially upon the mortality of the city at large, and which have little or no influence on the occupants of this tenement house. The almost universal use of closely fastened double windows, and hot air or water or steam heated rooms; the various exposures in dress; the want of regular physical exercise in the open air; the turning of night into day; the merry-makings of the rich, and long labors of the poor in ill-ventilated shops by day, and the night-watches of artisans at work for their employers; the long weary hours of the seamstress, &c.; the over-excited mental condition of society at large,—these causes, from most of which the tenement lodger is free, tend to raise the death-rate of the city.

When we look, however, at the terrible mortality connected with a residence in the cellar, or basement of the tenement building, and find that notwithstanding the greater freedom in the circulation of air in the bed-rooms of the basement, than in the rooms above (the bed-rooms being opened into one another so that a stream of air *may* be made to pass through the four rooms in which the family live), the death-rate becomes higher than that of the city at large, and that one-half of all the deaths in the building occurred there, we recognize the deleterious effects of a residence in that low, damp, dark and dismal place. Certainly here, if ever, the law ought to step in between landlord and tenant and should declare what the proprietors of the model lodging house virtually admit, viz.: that the basement is unfit for human habitation.

The part of our Report which gives the relative moral and individual conditions of tenants of the two houses, appeals to every humane instinct of our nature. We report the thrift, neatness and temperance that mark the model house, and on the contrary the filth, dirt, crime, drunkenness, and what is worse the apparently stolid indifference to their degraded condition that mark several of the occupants of the tenement house. The Rev. Dr. Channing used to say that the statement, if true, that the slave was happy in his lot, was no valid argument in favor of slavery, but rather one of the strongest arguments against it, inasmuch as the fact of his remaining satisfied and happy in such a lot, proved that slavery had thoroughly degraded all manly instincts. Hence when we read in our returns from the tenement house, that thirteen out of sixty-two families *liked* their wretched and filthy residence, and that twenty-one out of the sixty-two were *indifferent* whether they should go or stay, we feel the degradation to which human nature can fall. And we then turn with pleasure to the fact that forty-eight out of forty-nine in the model lodging house were *delighted* with their humble, but clean and healthy homes. Twenty-eight, however, of the sixty-two in the tenement house disliked it, and the reason for that distaste was the amount of noise, of drunkenness, filth, and possible theft that surrounded them. In other words, more than one-third of the dwellers in this wretched place virtually appeal, though mildly, like the poor Franciscan, to us for help. Should not help be extended to

them by some one? Who among our rich men are ready to come forward, and either individually, or by large combination of capital, erect model lodging houses like those described in this paper, or like those recently erected in London by the regal munificence of our distinguished countryman, Mr. Peabody, or by Sir Sydney Waterlow and Mr. Allen?

The examination relative to receipts for capital expended presents items that are eminently satisfactory from both houses. The income cleared from both is all that could be wished, notwithstanding the totally different class of building which gains the rent.

Prepayment for short periods, a week or thereabout, is the invariable rule in both. Doubtless much depends on the vigilance and decision of character of the proprietors, and of their agent. But when pure philanthropy and a steady six per cent. interest on capital can be combined, even the most practical common-sense business men need no longer stand aloof from this great undertaking of building suitable houses for the poor. In Boston this appeal is the more urgent at the present time, owing to the large improvements that are now making at Fort Hill, whereby thousands of our poor are driven from their homes, in order that their sites may be turned into vast thoroughfares of business. In this appeal let us suggest the following to the advocates of temperance. What human being is there who if compelled to live in such filthy homes as that presented by the low tenement house, would not be degraded and almost inevitably tend to drunkenness? Is not drunkenness, if for no other reason than to drown for a moment the sense of surrounding wretchedness, a most natural result? The cause of temperance thus becomes intimately blended with that of building pleasant homes for the poor.

Intemperance claims our attention under the law, and it strikes at the root of all health. Take away a man's or woman's self-respect, and you tend to drive them to low habits of body, and thence come disease and death. They no longer revolt at a filthy, unhealthy home. Place the same persons in clean, well-appointed apartments, where they can live in comfort with their families, and can attend to the decencies and proprieties of life, and they are lifted up morally; their intellect usually follows with an almost equal pace towards a true manliness and

womanliness of character and behavior, and with these comes a greater health of body.

But long before private charity and enterprise shall have erected homes for the poor, cannot the city authorities or the State do something towards improving this and many more tenements, equally or perhaps more degraded than the subject of our investigations?

By ordinance, the aldermen of the city of Boston act as a board of health for the city. By law they can examine all nuisances and order their removal. They can punish a man who disobeys the mandates of the board or council. They may notify tenants living in a place that proves a nuisance, and order its abatement.

They may even forcibly enter into any place supposed to contain a nuisance, and all opposers of their authority can be punished.

There would seem therefore to be law enough, if it were only carried out effectually.

Why is it therefore that such nuisances are allowed to exist? Is it possible that men can consider such places as not nuisances in the eye of the law? Surely anything that can add fury to a pestilence ought to be called a nuisance. These vile tenements do this. A basement that brings death at a greater rate than in the city at large, ought to be summarily closed as a place of residence, as a nuisance of the grossest kind.

This excuse therefore cannot be offered. The old-time maxim "What is everybody's business is nobody's business," really is the reason for the neglect. How can we expect the mayor and aldermen of the city of Boston to attend to such things? From the nature of the case it would be impossible for these officials to be able, if willing, personally to manage such details. It remains, however, as their duty, and they are bound by some means to abate such evils.

VII.

CONVALESCENT HOMES.

These noblest of charities and promoters of the health of the people, have recently sprung up in many of the chief cities of England. They do, perhaps, quite as much service to the poor as the various hospitals of the kingdom. They are intended—

1st.—To provide in the country rest from labor, and proper food and lodging for those who, while usually living and working in the crowded cities, become not really ill, but are in that condition, that if care be not taken, they will either fall into a state requiring hospital treatment, or become seriously and perhaps permanently ill.

2d.—To take care of that numerous class of patients who, having stayed a long time at the hospitals have recovered so far as to be discharged, and yet they are unable to attend to their daily work, and really need a few weeks of country air to thoroughly restore them to labor. Or

3d.—For perhaps an equally large class who, while having remained a long time at their own homes ill, are still unable to work, and do not seem to gain farther good from any remedy. Nothing has seemed to do them any good,—and their natures, as it were, unconsciously sigh for a breath of country-life.*

For all of these classes of invalids the Convalescent Home is a boon of inestimable value. Almost every person in the larger cities of Massachusetts has seen such invalids, and has lamented, if he have thought at all upon the subject, that there was not such a sanitarium a short distance from his own town, to which he could direct the sufferer.

Only a few years ago (comparatively speaking) a gentleman in London met such a case in a young female who had been

* "What these persons want are not hospital comforts, however liberally bestowed, no medicines, however skilfully prescribed, but the natural restoratives of fresh country air, good food, gentle exercise out of doors, and that mental quiet and freedom from anxiety which cannot possibly be the lot of the laboring man, while struggling at once against poverty and bodily weakness."—*Report of the Metropolitan Convalescent Institution, 1856.*

discharged from one of the hospitals in that city, too weak to work, without money, and with hardly a spot on which to lay her head. She appealed to the philanthropist. He saw her wants, but had no means himself to send her even for a few weeks into the country. He appealed through the journals for means to attend to this particular case. That newspaper article was the nucleus around which similar thoughts in the community immediately crystallized. And from it has arisen the really fine practical result, which declares that *every community of any size, and each hospital in large metropolitan districts must have a convalescent home*, or be faithless to the duties of a high humanity, which requires of each individual and each State to promote as much as possible, and by every reasonable means the general health of all. I wish to bring to your notice three institutions that I visited, in order to personally examine their working.

First.—The oldest and most comprehensive is the Metropolitan Convalescent Institution. It was founded in 1840. It has three homes, viz., the Asylum at Walton-on-Thames, and two children branches. In these last are taken children from two to fourteen years of age; one for girls at Hendon, Middlesex; and another for boys at Witcham. It has a central office at 32 Sackville Street, Piccadilly, London. The asylum at Walton is a large new building erected in a dry and healthy, but somewhat uncultivated spot. It presents an imposing appearance,—with its broad front, and with grounds tastefully arranged with shrubs and flowers in that peculiar beauty of landscape gardening much seen in England at the present time. The interior has large and airy corridors opening into wards or saloons for sitting, eating, sleeping, &c. All these have abundance of sunlight and sun-heat during the day, and free ventilation during day and night. Nothing extravagant or expensive is observable, but everything is provided to promote that complete rest for the body and soul which the worn-out invalid needs. In 1856 (after sixteen years of existence) the directors report that 8,000 had been received from the opening of it. Last year they reported that the building contains 260 beds, and that the “total number received annually exceeds 3,000. Patients from the various hospitals and dispensaries, and from the crowded courts and alleys all over the metropolis, are con-

stantly being received into it, and they in general are able to return to their employment with their health fully restored in a little more than three weeks."

The Institution is under the patronage of the queen and nobility, and is supported by voluntary subscriptions of very many private persons. It has a board of management consisting of 27 persons, and four trustees. Honorary and attending boards of physicians and surgeons are connected with it.

"Annual subscribers of one guinea, and donors of ten guineas, have the privilege of recommending one patient yearly. Annual subscribers of two guineas, and donors of twenty guineas, two patients; and every donor of thirty guineas and upwards, and every annual subscriber of three guineas and upwards, becomes a governor of the institution, and has the privilege of attending and voting at the general meetings of the governors, and of recommending three patients annually.

"Every clergyman who either lends, or himself makes use of his pulpit for a sermon in aid of the charity, has the privilege, if the sum amount to twenty guineas, of recommending for admission one patient yearly for the term of ten years, and for every additional fifteen guineas so collected, one additional patient yearly for the same term, provided that the words 'sums collected' be held to mean the actual amount paid in to the Secretary of the Institution exclusive of expense of collection, and exclusive of donations and subscriptions, for which the donor may claim a separate privilege."

I have entered into these details because this institution was the first, and is perhaps the most complete in its organization, and I have wanted to present the subject in a practical and suggestive form to the citizens of Massachusetts.

The institution for girls at Hendon I visited. It is under the same management. That and its companion for boys, at Witcham, are smaller; but judging from what I saw when visiting the Home at Hendon, it is under capital management, and promotes greatly the health of the few children from London their present means allow them to receive. The children grow stronger and recover health, and leave the place with sorrow. The home is in a village sweetly situated about a half-hour's ride from London. A conservatory and large playground and open green fields are adjacent, and to all of these the children have

free access. From three to four hundred children have each passed three weeks or a month there during the past summer. Only those who can walk about are received. If confined to the bed they are returned to a hospital or to their home. They have plenty of good wholesome food and fresh air, and the physician visits the place chiefly to see these remedies are freely administered.

In the report of the directors, 1870, I find the following:—

“It would be superfluous now to enlarge upon the great advantages which attend the careful working of Convalescent Institutions. Dr. Chadwick says that ‘no town hospital will be considered completely fitted for the discharge of its beneficent functions unless there be associated with it a Convalescent Institution at some distance in a country situation.’”

And this last remark naturally leads me to give a brief description of the magnificent Convalescent Hospital or Home recently opened under the direction, and for the sole use of St. George’s Hospital in London.

It is situated a few miles from London, but fully removed from its noise and smoke, in the midst of a beautifully diversified, undulating country. It opens to the South, and the sun bathes it all day long. It commands an extensive view of at least a five or six miles’ radius over hill and dale and woodland and cultivated fields. Flocks and herds quietly graze within view of the place, and the rooks caw over the adjacent fields. Everything is redolent of country life. It is a spot that of itself would prove a balm to many a sick soul wearied and almost worn down by London labor in a London atmosphere. It arose in this wise.

Mr. Atkinson Morley was one of the most active of the governors of St. George’s Hospital. That institution needed more accommodations and Mr. Morley had determined to enlarge it. But difficulties arose about getting the land adjacent to the institution in London, and a suggestion was made, why not build a new establishment in the country which may prove a convalescent home as well as really a ward of the hospital? The result was that Mr. Morley left by will £150,000 for the object. By direction of the lord chancellor about £50,000 have been used in purchasing the land and erecting the building,

leaving thus a large balance to meet current expenses. It has an imposing but very neat appearance. It is evident that while taste has presided in its erection, simplicity and economy have been sedulously attended to. It is built in the form of the letter T. The wards are grand in breadth and length, and fifteen feet from floor to ceiling. Ample room is given to each bed. The windows open to the south. The superintendent is allowed at present to receive one hundred patients only, fifty of each sex. It was opened less than a year since, and no report has yet been printed of the results. But no one can visit it and doubt for a moment of the immense aid it is destined to give its metropolitan parent, from whose wards alone the invalids are to come. The two are merely complementary, one of the other. Similar institutions ought immediately to arise in all the large cities of this country. Will Massachusetts take the lead in this most beneficent of sanitary measures?

The two methods of public hospital and of private benevolent subscriptions might easily be united. In Boston, for example, what prevents the united efforts of the various hospitals and of the Boston dispensaries with private charity establishing a convalescent home in some healthy suburb of the metropolis? And why should not Worcester, Lowell, Lynn, Fitchburg, &c., have each its "*sanitarium*" of the same nature? I suggest these facts and these reflections to the Board, and through the Board to the people of Massachusetts, in the sincere hope that they will tend to the practical result *of the establishment of such institutions wherever they may be needed in our State.*

VIII.

SEWAGE. WHAT SHALL WE DO WITH IT? THE EARTH-CLOSET.
IRRIGATION OF LAND. DRAINAGE TO THE RIVERS OR SEA.

There is no single subject that is attracting more attention in England, and which excites (strange as the remark may seem to some people in Massachusetts) more heated partisanship,

than the vast questions looming up under the various names of "earth-closet," "water-closet," "sewage," "its danger to health," "its widespread and fatal waste," "its utilization as a manure," &c. In other words the great sanitary question of to-day throughout Great Britain is the economic removal from houses of what is deleterious to man, and the proper use, as a source of income, of what has been heretofore wholly wasted. Thousands of pounds sterling are annually sent from England to Egypt to gather up the old mummied remains of past centuries of men, or merchant vessels sail round the world in order to gather the fæces of birds, that perhaps for equally long cycles of time have brooded over some one or more of the beautiful islands of the Pacific Ocean. And all this expense is incurred, while actually throwing away immense quantities of a material having the highest fertilizing qualities.

These vexed questions cropped out and were bandied about from section to section of the meeting of the British Association for the Advancement of Science, recently held at Liverpool, and presided over by the celebrated Huxley.

First. The section on health spoke often of it in regard to sanitary measures. Then it occupied an entire session of the engineering department. Finally, it absorbed much of another session of the chemical section in hearing public reports on the subject, and in listening to the appeals of Mr. Forbes for his plan of so "*throwing down*" all the substances deleterious to health, while saving them for manures; and he informed us that he did that so thoroughly and cleansed the sewage water of the Thames. Mr. Forbes was willing to pour into a wine-glass a portion of the water thus purified and, martyr-like (as some of us thought), sipped it in our presence to prove its perfect innocuousness and sweetness! These questions, more than any other, were in fact the *marplots* of many sections and had to be frequently suppressed, or rather *repressed*, by the presiding officer of the particular section in which it appeared. For example, the chemist kept the discussion simply to the chemical aspects of the question, and all engineering or simply sanitary ideas were sedulously kept away. They had, strictly speaking, no right in the laboratory. And so it was with the other sections. I mention these facts simply to prove the great and wide-spread interest in the subject.

In the social science programmes, widely distributed during the meeting of the British Association, it was distinctly brought out as a reason for going to Newcastle-on-Tyne that the subject of sewage would be thoroughly examined in all its bearings upon the health and prosperity of the community. Induced by that fact I attended that meeting. The subject was every day brought up in some way or another in the health section, and I soon found that partisan violence was not confined to republics alone, nor to political parties, nor could theology ever produce more bitter denunciations than were poured out by one party upon the other upon this subject. If I had not been amused I should have been indignant at hearing men whose works I have read for a quarter of a century, and thought were men of consummate wisdom, sagacity and coolness, use language worthy of Billingsgate toward an unlucky and persistent supporter of the "earth-closet" idea. This poor, abused article, which many have found so serviceable to their houses, and private rooms, would have been utterly annihilated if the venerable statistician and writer on health could by any word of his have gained that end. One opponent of this unhappy article declared, for his part, that he was unwilling to "take counsel" from so foolish a creature as the cat who, from the time of Noah, has quietly been teaching what Rev. Mr. Moule proclaimed, *ex cathedra*, only a few years ago. Dr. Farr at length came to the mediation of both parties by suggesting that, after all, both had the same object at heart, viz.: the disinfection and removal of unwholesome articles from our homesteads, and the only diversity of opinion was on a minor point, viz., the method to be pursued for that disinfection and removal.

Surely a subject that excites so much attention in England as a sanitary and economical and, incidentally, a vast engineering measure deserves our candid attention. I cannot throw much light upon the subject. Nevertheless, as I looked into some of the practical schemes now in operation, I propose to give to the Board the results of my experience in this matter. I begin with the

EARTH-CLOSET.

I saw this in full operation in two places, viz.: at the villages of Halton and Beverly near Tring, and at the International Hos-

pital at Bingen on the Rhine. In all these places it was a perfect success. Halton and Beverly are small villages containing about fifty families each. Till Mr. James, an intelligent gentleman residing in the neighborhood, introduced the earth-closet system, every family either had its own privy close to its own premises, or used one in common with others, thus contaminating, as I learned on inquiry from the tenants, the houses in which they lived. About five years since Mr. James, being annoyed by effluvia from the privy adjacent to his own house, and which he vainly endeavored to remedy, tried Mr. Moule's system and with entire relief. Accordingly, with an excellent public spirit, and the sagacity of a practical farmer, he determined to persuade his humbler neighbors to adopt the same. The plan he pursued was as follows: Under a few small sheds he arranged an iron plate three-quarters of an inch thick, about four feet square, and raised upon bricks about a foot from the ground, to allow a fire to be lighted under it. The brick walls rise two feet above it. Thus a large pan or furnace with a strong iron bottom and brick sides is made for drying the earth. A load of earth can be dried sufficiently by one night's subjection to this heat. Half a load answers for a family of six for three months. He has used upon his land from eighty to ninety of such loads, after having passed through the closets twice. The result has been excellent. All the crops have been superior to those produced on neighboring estates treated on the old plan. The manure acts better than London manure or guano; especially does the amount of grass very greatly increase in quantity and apparently in quality.

Meanwhile the villagers find a great relief from the use of it.* All odor is absolutely removed—what was a nuisance and discomfort, to say the least, headaches, &c., not to allude to higher dangers which some sanitarians claim to come from, and which do at times undoubtedly come from the taint of privies and bad-smelling drains; all these have disappeared. I conversed with the villagers, and all who have employed it like the method. A man is kept continually employed by Mr. James to dry the original earth, to carry enough for a week in turns to the various houses, and to remove that which has been

* It is used now by five-sixths of the families, and in two schools of 200 children and with equal success in all.

mixed with human excreta, liquid and solid. This by the subtle alchemy of nature, is found to be simply a dry, disintegrated pulverulent gray mass of inodorous matter. Even paper wholly disappears in it. The accumulations from the various families are placed under sheds opened in front, so that free access is given to the external air. After three months it is again dried and used anew. I visited these various places, the privies, the sheds, furnaces, &c., and found no perceptibly unpleasant odor, even in that portion most recently taken from the village. It was evident that arrangements could be made for boxes (earth-closet privies) of any size requiring removal, either by the week or year. All would be alike inodorous and cleanly. Surely here was a success in every respect. The village health and the purity of the home were improved, with great pecuniary gain to the far-seeing farmer, and the waste which was previously allowed of valuable manure was no longer possible after such positively good results. The earth-closet cannot be styled a "quackery," as the venerable ultraist of the water-closet system called it at the social science meeting at Newcastle.

I saw the same system carried out at the International Hospital under Dr. Thudichum. At one end of the camp street a furnace has been erected similar to that at Halton. Each hospital tent has its own earth-closet, and it was absolutely devoid of smell, so far as I could judge, and the surgeon in charge had found it to act perfectly as a deodorizer, and without any of the unpleasant accompaniments that chloride of lime and other disinfectants usually carry as a necessary result of their use *. Similar results have followed its use in America, and it therefore should be considered as an invaluable addendum to modern civilization.†

* Mr. Edward C. C. Stamford, F. C. S., Chemical News, April 19, and Oct. 22, 1869, advocates the use of pulverized charcoal as being very efficient, being much less bulky than earth. He employs sea-weed charcoal. Mixed with the excreta, the whole soon becomes an inodorous dry mass which can be used again, and if need be reburned. One cwt. of charcoal will serve for a month in a closet used by six persons, and may be allowed to fall into a cess *pit* under the house.

† For a most thoroughly exhaustive examination of the earth-closet, and a detailed account of its use in villages, towns, &c., in England and elsewhere, see Dr. Buchanan's admirable account in the last Report of the Medical Officer of the Privy Council, 1870. I read Buchanan's paper after preparing this letter, but preferred not to alter my own statements, as they did not clash at all with the results obtained by that gentleman.

But it will be doubted whether its use can be extended with sufficient ease to large cities, although the earnest advocates of it claim that it is perfectly easy so to do. I will not pretend to discuss this point, but will describe two visits I made, in order to observe two applications of the water system. They present, both of them, examples of what is now constantly being done in England, viz. : of the carrying away of materials supposed to be always, and certainly at times, very destructive to human health and often causing wide-spread mortality.

A few years ago the Thames became so offensive to the nostrils of all the citizens who came near it, that with one accord the believers in the actual noxiousness of these exhalations from it, polluted as it was by thousands of water-closets, and all others who did not like to have any unpleasant smell come betwixt "the wind and their nobility" even if it be not unhealthy, united for the cleansing of the Thames. Accordingly, the city of London under the "engineering skill" of Mr. Bazollette, made two immense sewers, one on each side of the Thames, from the metropolis down to short distances below the two villages of Barking on one side and Crossness on the other. At these two spots, by means of huge openings closed by an elaborate system of gates, the flood of water from all London, after being dammed up for some hours, is twice daily at high tide let out into the Thames. 1st, To waste all the manurial qualities it contains. 2d, To contaminate the villages near and below these outlets on the Thames. This is strongly urged by some and with some show of argument drawn from special cases of local infection from drains, &c. By others and by thoughtful physicians and sanitarians too, this broad assertion is doubted—as one eminent member of the medical profession (whose works at the present time have much influence) said to me : "It was the *stink* rather than the proved unhealthfulness of the emanations from the Thames that compelled the city to carry the water-closet draining to Barking." This was accomplished at the enormous expense of £4,250,000, or £180,262 per annum, the cost to be paid off in forty years by rating"* 3d, To gradually fill up the Thames, and thus seriously to interfere with navigation. This too is doubted. A parliamentary commission, on investigation declared both of the

* A Chemist's View of the Sewage Question. Chemical News, 495, p. 6.

latter propositions false. But one can hardly see how if sewage emanations be pernicious to Londoners, they should not be so likewise to simple villagers.

I wanted to see and judge for myself, so far as I could by inspection and conversation with the inhabitants, what effects had been produced, and what would be the influence on my own senses of the emanations at the outlet. Accordingly I visited Barking, and fortunately met Dr. Parsons, the officer of the Union in that town, an active, earnest and thoroughly accomplished physician, one too who has the power to examine carefully facts, and to modify his opinions, if need be, under the influence of facts. He had joined with his fellow citizens in protesting against the allowing of London sewage to enter the Thames two miles below Barking. He felt persuaded that it must be injurious. He was called upon by the government commission to present facts, and he began to collect them under the impression that the result would be as he and his fellow citizens had supposed. But he has found that death statistics do not at present (after a lapse of two years' exposure) sustain that view. Seventeen per thousand living is the death-rate of Barking. He was surprised at this result. He remembered, moreover, that he had not been especially called to persons residing near the outlets, and there was no greater amount or peculiar character of disease prevailing there than at other spots in his circle of practice. Dr. Parsons drove me to the outlet. Our course for nearly half a mile was directly upon the top of the drain. Every few yards I saw gratings of iron, which I learned were the ventilators of the sewer, but I observed no special odor arising from them as I had expected. We were driving simply over a smooth greensward. Arrived at the mouth I placed myself directly over the partially running stream. It was low tide, and I could see the whole of the opening. I stood over the ventilator just above the gates, and where I knew that there was a large quantity of sewage water. I was still more surprised at the absence of odor in all these places. The keeper of the gates has a house and rears a family above, and between them and the outlet into the Thames. He assured me that he never observed any peculiar odor, and that his family enjoyed good health.

The inferences I was obliged to make were: 1st, That by

some means unknown to me the excreta had become deodorized during the water carriage; and 2d, That at present there was no proof that this deodorized sewage water of London does actual harm to those dwelling near it. I remembered Boston and other cities of Massachusetts with a sense of, at least, partial relief to my previous thought that a drainage that merely empties our water-closets into the docks around our city must inevitably be injurious to the health of our citizens. It is true that I am not aware of any city in Massachusetts having such *long* sewers as those from London, and therefore Boston, Charlestown, &c., have not exactly analogous circumstances with those of Barking and Crossness.

But there is one fatal defect of London and of all American sewage, and that is its waste. Probably there is no such widespread recklessness of spendthrift prodigality anywhere so noticeable among civilized nations as this throwing away of such vast amounts of this most excellent of manures. We take thousands of tons from the earth annually, and totally ignoring Nature's law of economy, which declares that what has been once taken away must be returned again to earth, otherwise the earth itself will become impoverished and will refuse to labor for us, I say totally ignoring this law, we squander an immense amount of really valuable property.*

Among those who have protested against this wholesale waste none has been more prominent than William Hope, Esq., V. C.,† the lessee of the now famous Breton Farm. By his energy a bill was passed by Parliament at its last session, authorizing a company to use this wasted material. For some private reason the measures intended to be carried out by its provisions have not been inaugurated. Meanwhile Mr. Hope took the Breton Farm under the following circumstances. I visited and examined his works, and propose to give a slight account of what I saw and heard there.

* It is calculated that not less than £1,000,000 is annually thus thrown away by London alone. Digest of Facts relative to the Treatment and Utilization of Sewage, by W. H. Corfield, M. A., M. B. Oxen, &c., &c., for the Committee of the British Association for the Advancement of Science. McMillan & Co., 1870.

† Mr. Hope (see address for London Society of Arts, Feb. 25th, 1870, Journal, page 299, vol. 18) takes the strongest grounds on this matter, and claims that English pauperism is vastly increased by this wholesale waste of material, which if used according to modern science and with modern appliances, would enable a vast deal more of cheap food to be raised.

The town of Romford contains 8,000 inhabitants. It was desirous of a better system of sewage, and having introduced a supply of water, conducted its sewers into the adjacent river. This the inhabitants living below the town protested against as polluting the water they had previously had pure for use. An injunction of the Lord Chancellor was laid upon the town authorities, who, in looking around for a remedy, bethought themselves of using the whole for fertilization of the Breton Farm, about three miles from the town. Accordingly the sewer mouths opening on the river were closed, and a system of drainage by large iron pipes conveyed the sewage to the Farm. For some unknown reasons the plan was not successful, and Mr. Hope came to the rescue, and has taken the land at less than £3 per acre, and as he pays about £6 per acre for sewage from the town, the sum is less than £9 per acre for all expense of hiring land and manure. He commenced twelve months since, and the first crops were put in last March. The result, though in every respect gratifying as a pecuniary investment for Mr. Hope and as a sanitary measure for the town, cannot as yet be thoroughly estimated until after a longer trial. I visited and examined the farm thus laid out for cultivation. It is on a tolerably level piece of ground, but by means of his steam-shovel Mr. Hope levels and arranges, with tolerable ease, very uneven surfaces.

A large cemented reservoir receives the water from the pipes. It is a thick, dark fluid; but strangely enough, scarcely any odor comes from it. It is pumped by a steam-engine into a tank and distributed in a fluid state by means of open iron troughs where the height is too great, and cemented pipes where near the ground. These troughs are a foot and a half broad and equally deep, and rounded at the bottom. The cemented ones have apertures thirty feet apart, with gates for closing when necessary or for communicating with gutters in the ground which run in straight lines 150 to 200 feet. In this way the farm is divided into several rectangular lots which give an opportunity for rotation of crops. The extraordinary growth of every plant thus fertilized draws the attention of every visitor. Carrots, four and a half inches in diameter at their top, and a foot long! Mangolds, twenty-nine and thirty-six inches in diameter, and pressing up like huge monsters from

the ground. Cabbages, huge and compact. Immense beds of rich and firm cauliflowers. Potatoes, eight or nine inches long, and weighing at times two lbs.! Hay, of delicate fibre and eagerly sought for by cattle, can be raised in three crops annually, and in quantity five acres produced twice as much as twenty-five treated by the usual former method. I leave all these results, however, for the practical farmer and agriculturist of Massachusetts to consider, and will finish this brief sketch of the whole subject with two cautions in a sanitary point of view.

While walking over the ground I perceived that the grass had the rich green usually noticed in wet lands, and my shoes often came into muddy spots, while no spot over the entire surface was dry. The whole land was in fact filled with moisture, doubtless fertilizing and raising crops unheard of previously. But I remembered two well established facts upon which I base two sanitary cautions: 1st, moisture of the soil is now fully proved to be a promoter of consumption in England as in New England. Probably the same law, modified doubtless by circumstances, holds good everywhere. Hence the workmen should not live in houses too near such sewaged earth, but rather on dry, elevated spots a little removed from it.

2d. Sewaged water has heretofore and may hereafter contaminate wells of drinking-water. Hence great caution must be, for the present at least, observed in the use of wells that are in the midst of such earth.

One very serious difficulty arises in the use of sewage water in this country as practised at Breton Farm. The irrigation is continued with ease in the climate of England during the winter. The heavy snows and freezing cold of a New England winter would seriously obstruct similar plans here, and although perhaps these difficulties might not be insuperable, they would have to be taken into serious consideration by any one who should propose to try irrigation in our Northern climate. The same objections do not exist against the earth-closet. The question arises whether at times both methods may not be used, but at different seasons of the year.

FINAL APPEAL.

For all these various sanitary and philanthropic measures what need have I to add a single word of appeal to the capital-

ist and philanthropist of Massachusetts? Is there anything but the *will* and *individual* and *coöperative* action needed in order to inaugurate in our State systems similar to, at least, some of those described in this communication? Who are prepared to give to all laboring men neat and healthy homes? Without these it is all vain to try to raise the people to a proper self-respect, and enable them to bring up their children in a manner worthy of a great and free Commonwealth; and some of these children must inevitably become the future parents of the State.

Who will spring forward to aid the heavily-burdened laborer, or seamstress, or shop-girl, or hospital invalid, all sighing for a breath of country air, and of their abundance will build and amply endow convalescent homes?

What farmer or town will, while removing sources of disease and mortality from house or town, follow the dictates of Nature and utilize their sewage, or at least deodorize it by the use of the earth-closet, or by the more thorough and more expensive plan of irrigation, make use of it?

All these questions I submit to the Board, as guardians of the public health.

Respectfully, your friend and colleague,

HENRY I. BOWDITCH.

APPENDIX A.

SUMMARY OF ENGLISH LAW IN REGARD TO COMMON LODGING-HOUSES.

The two Acts for "the well ordering of Common Lodging-Houses" of England under which the police act, were passed July 24, 1851, and August 4, 1853.

Their provisions are as follows:—

The Act is to be executed either, 1st, by the Commissioners of Police of the Metropolis; 2d, Local Boards of Health; 3d, Mayor,

Aldermen and Burgesses of the Borough; 4th, Commissioners, Trustees or other body by whatever name known, for executing the "Improvement Act" (an Act which was passed relative to paving, drainage, lighting, watching, etc., of any place); 5th, Justices of the Peace acting in petty session for the place.

The expenses are to be charged to the general accounts incurred under each of the above departments.

Notice is to be given to each Public Lodging-House keeper requiring him to register his house.

Which register is to be kept by the local authority.

After one month's notice no lodging-house to be used as such until "inspected and approved" by the "local authority," and registered.

The "local authority" may make regulations for governing such houses, which must be approved by one of the principal Secretaries of State.

Penalties may be imposed by "local authority" for violation of such regulations.

The keeper of a Lodging-House must give notice to the Medical Inspector of cases of contagious disease.

He shall allow the Inspector to enter when he may think proper.

He must keep his premises clean, to the satisfaction of the authorities, and attend to drains, privies, &c.

He may be fined £5 for neglect of any of the regulations, or imprisoned if he do not pay, or for third offence may have his license taken from him.

The above are some of the items of the law of 1851. That of 1853 confirms the above, and adds,—

That unless a Lodging-House keeper can get a certificate of good character the register of his house may be refused.

The "local authority" may require a more perfect supply of pure water.

Sick persons affected with infectious or contagious disease may be removed to the hospital, and their clothing disinfected or destroyed at the public expense.

Reports of those who resort to the Lodging-Houses may be ordered from keepers.

The "local authority" has power to remove nuisances.

CORRESPONDENCE

CONCERNING THE EFFECTS

OF THE USE OF INTOXICATING LIQUOR.

R E P L I E S

To Inquiries concerning the Effects of Intoxicating Drinks on Public Health, received from our Correspondents in Massachusetts.

One hundred and sixty-four (164) correspondents have answered the following question :—

“What, in your judgment, has been the effect of the use of intoxicating liquor as a beverage upon the health and lives of the people in your town, or in the region in which you practise?”

The replies are as follows :—

Very destructive to life and health,	48
Injurious in a greater or less degree,	49
Public health not affected by use in their towns,	16
The people of their towns very temperate,	27
Intoxicating drinks not used in their towns,	5
The effect is bad upon foreigners in their towns, but not upon natives,	4
Useful in the decline of life,	1
Use promotes longevity,	1
Indefinite replies,	13

The following extracts from letters give more information on this subject :—

“I am satisfied that the free use of intoxicating drinks is a moral evil that tends strongly to injure the physical health.”

“Observation has satisfied me that the use of intoxicating liquors as a beverage does not improve the physical or mental system, but is adverse to the best condition of both. I am positive that drunkards die from consumption.”

“As far as my observations extend in a practice of more than thirty years, the use of intoxicating liquors has not been injurious to the health or shortened the lives of those who have used them temperately. The intemperate use of alcoholic drinks, and other excesses to which it leads, has caused the death or shattered the constitutions of many young and middle-aged men in this vicinity; but rarely do I meet with a very old man who has not been in the habitual use of stimulants in some form, and accustomed at the same time to active exercise.”

“Among the American population, not an individual is known whose health has been injured by drinking. Among the foreign population, there is hard drinking on Saturdays and Sundays,—and in some cases (but few, however) general health has been thereby injured.”

“Intemperance in the use of intoxicating liquors, with the usual concomitants, lewdness and debauchery, are the causes of a very large share of the diseases I am called upon to treat in the State Almshouse.”

“I do not think intoxicating drinks have any general influence on the health of the people in this town. Individuals have, however, been known to be seriously injured. It is not to be generally procured, and those who use it are obliged to submit to long intervals of total abstinence.”

“I have had occasion to see but few cases of suffering directly from the free use of intoxicating liquors, but these have been sufficient to convince me that such use is detrimental to health and life.”

“Delirium tremens less common now than formerly, but we see, as effects of intoxicating drinks, a trembling gait, and general debility of nervous system, and I have been led to think that these symptoms might be due to adulterations, rather than to alcohol.”

“The health of the inhabitants of this town I do not think is materially affected by the use of intoxicating liquors; there are those who say they almost die for the want of them.”

"There is no great abuse of intoxicating liquors in this place. Their influence on public health is small."

"I do not think that intoxicating liquor has been used as a beverage to such an extent or degree as to produce a perceptible effect upon the general health and lives of the people in the region of my practice."

"Intoxicating liquor has invariably proved a curse to those who used it as a beverage."

"Injurious wherever habitually used. Has destroyed many lives in the fifty years of my observation."

"Not injurious unless taken to excess."

"Intoxicating liquors have greatly injured the health and lives of those who use them habitually as a beverage."

"As regards the use of intoxicating liquors, I believe that there are individuals who would enjoy better health than they now do if they would use them temperately. But there is vastly more suffering from intemperate use than from abstinence. On the whole, I think we should be more healthy, wealthy and wise if they were entirely banished from society."

"I have very few cases of sickness which I am able to trace to the use of intoxicating liquors. Many aged persons are within the range of my observation who have always used liquors as a beverage without apparent injury. I have the impression that in this region persons who habitually use spirits are less subject to lung diseases than are the average of total abstainers, but I can give no exact data to prove this opinion."

"To answer the question regarding the use of intoxicating liquor as a beverage, we must divide the inhabitants into two sections, natives and foreigners. There is no excess with the former in this community. The foreigners, particularly the Irish, many of them drink freely, and the result is most disastrous to them. Health is injured, and lives prematurely destroyed."

“Intoxicating liquors the source of much existing disease.”

“The use of intoxicating drinks has been so far as I can judge only productive of evil, and he who uses them has need to say often the prayer of St. Chrysostom : ‘God keep my body from the doctors, my money from the lawyers, and my soul from the devil.’ ”

“The effect of the use of intoxicating liquor is here, as everywhere, injurious to health and destructive to life. Never useful as a beverage, and seldom, if ever, as a medicine. The users are not the only sufferers, but they leave to their children an inheritance of bodily and mental disease.”

“I believe that three out of four adult males use intoxicating drinks as a beverage, or on small pretext, but I see no effect upon health. Those who drink at the hotel, all belonging to the laboring class, are not sick oftener than others, but suffer in their pecuniary and social interests.”

“Intoxicating liquors are extensively used, and by a proportion of all classes. More was used in 1869 than in any previous year since 1857. No disease resulting from its use has come to my knowledge.”

“I think people who use liquor moderately here are less liable to disease than those who do not. They are also as long-lived. Used excessively it produces disease. I think, if liquor was pure, the moderate use would be conducive to health, especially in those of attenuated habits.”

“Intoxicating liquors have injured health and shortened life in proportion to their use.”

“There is no very marked effect on the life and health of our people from the use of intoxicating liquors. The Irish use it most, but only a few instances could be pointed out in which very special mischief can be attributed to it in regard to life or health. Of course there are cases of unthrift, of squandering, of family abuse, &c., such as must naturally arise from the gradually benumbed conscience.”

“Intoxicating drinks have a decidedly injurious effect upon life

and health, and are far too much used in the treatment of disease. Tobacco is doing even more than liquor to undermine the constitutions of the men of this region."

"The abuse of alcoholic liquors is a fruitful source of both crime and disease; but their use under certain conditions appears to me to be indispensable."

"The effects of intoxicating drinks among our inhabitants have been rather moral than physical."

"The use of intoxicating liquor has a very injurious effect upon our inhabitants. We are but three miles from the New York State line, where liquor is sold freely; and our poor Irish laborers spend their money for that which brings them only sickness and poverty, with all its privations and exposures."

"The same general law operates here as elsewhere. They who sin through intemperance suffer its penalties. The amount of sickness and the rate of mortality are increased by the use of intoxicating liquors."

"Temperance is the rule; intemperance the rare exception here. I remember one man who killed himself by the daily use of N. Y. brandy, and another who drank all the N. E. rum he could get, but would drink no other form of spirits, and who was intoxicated the most of his time, who lived to the age of ninety-three."

"The effect of the use of intoxicating liquor has been to ruin health, and shorten the lives of the people."

"Predisposes to fever and rheumatism, and shortens life very decidedly."

"In my judgment a very disastrous sequence of results follows the use of alcoholic liquors as a beverage. They impair the vigor and elasticity of the body, and impede the functions of its organs; they produce diseases of the nervous system, and I have no doubt of their hereditary influence."

“Injurious always, from first to last.”

“Impaired health, shortened lives, feeble offspring.”

“The cause of much debility and disease.”

“Better health and longer life would have been secured had the population abstained entirely from the use of intoxicating liquors as a beverage.”

“The effects of alcoholic drinks are plainly seen in the families of those who in past years drank to excess. Tobacco is now doing more to shorten life than liquor.”

“When I came here forty years ago there were three stores and four hotels where liquors were sold, and they all prospered,—they sell none now. The difference is very visible. Comparing the past with the present confirms the belief that the use of liquor as a beverage is very injurious; that it often acted as the primary or predisposing cause of hepatitis, gastritis, enteritis and rheumatism. If there was a proclivity to any disease, it often excited that latent principle to action, and hastened it on to a fatal issue. It has been, and still is injurious to the health of the individual, to the health and happiness of his family, and to the treasury of the town.”

“I think that the use of liquor impairs the health, and has shortened the lives of some, especially when used to excess. I think that persons who drink liquor do not bear up under acute attacks of disease as well as those who abstain from its use.”

“The use of malted, fermented, or distilled liquors in this place has affected neither the health or lives of the people to any extent.”

“Intoxicating liquors kill more than all diseases.”

“My impression is, that the use of intoxicating liquor as a beverage not only exercises a very pernicious influence on the moral and

social condition of our people, but undermines health and shortens life."

"I know of but few instances in which such liquors are used at the family table; in those few instances it is mainly wine, and I think it beneficial. The drinking of ale and distilled liquors at secret bars is sufficiently common to come to my attention as cause, direct and indirect, of no little disease. Were open bars allowed I know no reason why this evil should be less."

"On the whole, the effect is injurious. I should, however, make a distinction between the use of intoxicating liquors and the lighter drinks. If we could so manage as to furnish the people with light wines, lager beer, and such drink, and dispense with distilled liquors, I believe that the community would be immensely benefited."

"I have had a large practice among the Germans for twenty years, and my observation has been that they are remarkably free from consumption and chronic diseases. I have attributed it to their free use of lager beer. I believe that the moderate use of the lighter drinks is beneficial."

"Many persons can use liquor as a constant beverage without injury to their health, but I am confident the majority cannot, and are injured by its daily use. My judgment is that the health of the people would be better and their lives longer without the use of intoxicating liquor as a beverage."

"People very temperate. A very few persons use liquors excessively and thereby injure their health and perhaps shorten their lives. One instance only, I now remember."

"I know of no disease in this town traceable to the use of intoxicating drinks."

"From a comparison of the habits of life of the aged persons, who have died here since my remembrance, I have formed the opinion that a moderate use of spirits has no tendency to shorten life, or impair its vigor; while an immoderate use tends to produce both these results. I am not partial to its use in consumption. In cases

attended with bleeding from the lungs it shortens the disease by shortening the life of the patient."

"Effects injurious, and more so of late from the bad character of the liquors sold."

"There are cases where the use of intoxicating liquor as a beverage is useful, especially in the decline of life. Where the body is gradually becoming weakened by age its use in moderate quantities, of good quality, taken with regularity, has a tendency to keep up the tone of the system, and to prolong life."

"Unfavorable to health. The same may be said of strong tea and coffee."

"When used temperately such liquor has seemed to do no harm; when used intemperately its effects are disastrous."

"I cannot see but that moderate drinkers are as healthy as any."

"I have observed no peculiar effects on health in this town from the use of intoxicating drinks, but the habit of opium-eating and the use of preparations of opium demands attention."

"We have little intemperance, but it is found to be invariably destructive to health and life. Moderate drinkers suffer from the habit when attacked by ordinary diseases."

"Happily we have no grog-shops, no place where liquor is sold. But very few of our people are habitual drinkers. The blighting curse of rum is not upon us."

"We see but little disease caused by intoxicating drinks. In more than thirty years I have seen not more than two or three cases of delirium tremens. Among the few persons using such drinks, we see diminished ability to labor, and such diseases in their families as are engendered by want, care and discouragement. All

cases of *gangrene senile*, which have come under my observation have been persons accustomed to indulge in strong drink. Most cases of cancer have been either among hard drinkers or their immediate descendants. My own belief is that the use of intoxicating drinks, combined with the free use of pork as food, constitute a prolific source of cancer. Confirmation of this belief, of course, needs a far wider sphere of observation."

"This is a quiet farming town, without a railroad until the present year, and there have been but few persons addicted to the use of intoxicating drinks. But in such cases the effects are unequivocal. Sometimes death from delirium tremens, or from accidents occurring while intoxicated. In others, where the liquor is used more moderately, its subjects are rendered more irritable, more easily affected by disease, and less likely to recover from it. I have had many patients whose life or death was apparently determined by their previous habits as regards the use of intoxicating drink. I have often noticed also that one or more of the children of a drinking parent possessed a feeble constitution, or mental incapacity, or both, and perhaps a scrofulous tendency. But this is not true of the children of all such parents. The propensity to drink is also sometimes transmitted, although not very generally, because the children are warned by the effects which they see. I recall the family of one notorious drinker, but one of whose children was addicted to the habit, but several of whose grandchildren (and not sons of the drinking son), inherited the propensity. On the whole, therefore, I judge that the effect of the use of intoxicating liquor as a beverage is deleterious, and frequently ruinous to the health, and that it very often shortens the duration of life."

"There is a great deal of intoxicating drink sold in this town. The population is but little over two thousand, and there are probably a dozen places where it can be bought. I do not propose to discuss the effect of this from a moral point of view, but to speak of it physiologically. I am of opinion, as the result of observation, that the use of these drinks is the cause of ill health not so much to the drinker himself as to those with whom he holds intimate relations. It is very seldom that I am called to a case of sickness where I can say that alcohol was the direct cause of the disease. Excluding cases of disease of the liver and kidneys and delirium tremens, it seems to me that habitual drinkers enjoy as good health and are as long lived as their more temperate brethren. I am very

seldom called to treat a case of consumption in an habitual drinker, and when we do find such, the disease seems to be brought on by the attendant vice, debauchery and poverty, rather than by the spirit-drinking itself. I do not find that spirit drinkers are more subject to inflammatory diseases.

“I have run over my day-book far enough to include the last one thousand cases for which I have prescribed, and among them all I find but eleven caused by alcohol. These eleven cases apply to seven individuals, as some of them applied for treatment at different periods. I have not been able to see that any of the children born in this town during the treatment of these one thousand cases have inherited any physical weakness or any disease from their parents being addicted to drink. This does not prove that the inordinate use of liquor is not at all injurious to offspring but it seems to show that individuals may at times even drink to excess and still the offspring not be injured by it. I know a number of men who have large families of healthy children and yet during all their married life have been hard drinkers. One reason for this may be that the children were begotten before the intemperate habits of the fathers had injured their systems. The effect of drunkenness of mothers upon their children would no doubt be worse. I know of but one such, and her children born since the habit became confirmed seem to be as sound as the others; but one case is not enough for proof. With few exceptions, the bad effect of spirit-drinking on the health of the people of this town, as they now drink, is an *indirect* one,—not so much affecting the drinker as his family,—subjecting them to hardships and mortifications, and by the well-known weakening process of these influences, rendering them more open to the inroads of disease. The practical conclusions which may be derived from the preceding observations are these: Moderate drinkers are not more subject to disease than the strictly temperate, if we except cirrhosis, and perhaps Bright’s disease. Immoderate drinkers suffer from disease which is attributable to the collateral dissipation and exposure rather than to the spirit itself. The proportion of disease caused directly by drink to disease of all kinds is only one per cent. in my experience.

“The children of moderate drinkers are as perfect as those of the strictly temperate, both physically and intellectually. The children of fathers who were excessive drinkers, unless their fathers were intoxicated during the act of their generation, are apparently equally sound. The effect of alcohol on the physical economy, in not excessive quantities does not appear to be the direct cause of any of our prevailing diseases.

“That alcohol, used to excess, has an injurious effect on the moral and intellectual faculties, and that it leads to vice of all kinds, and is the cause of great domestic misery, and is thus the *indirect* cause of much physical suffering, there can be no doubt.”

“This may be called a temperate community. The effect of the use of intoxicating liquors is by no means uniform. While I can recall many instances of ill-health from its use I can recollect very few where it manifestly shortened life. There have been many notable instances of great age in men who have always drank.”

This closes the remarks on this subject by our correspondents in Massachusetts. We now present the correspondence from foreign countries.

The following letter was addressed by the Chairman of the State Board of Health to a great number of representatives of the United States Government in every part of the world :—

BOSTON, Feb. 23, 1870.

DEAR SIR :—The State Board of Health of Massachusetts is, by law, ordered to study the influence of intoxicating drinks on the health and prosperity, etc., of our people. It desires to get information from various countries in regard to the whole subject. I would therefore respectfully ask you to be kind enough to tell me :—

1st.—What are the chief intoxicating articles used in ———.

2d.—What amount of crime is produced by them; and their effects on the health and prosperity of the people.

Under the last question we would like to have your opinion (if you are willing to give it) as to the relative amount of intoxication in the country where you are now residing, and that seen in the United States.

We would like also any official statistics of the amount of intoxication and of crime resulting therefrom.

I remain, very respectfully yours,

HENRY I. BOWDITCH, M. D.,
Chairman of the State Board of Health of Massachusetts, (U. S. A.)

The following replies were received previous to January 14, 1871.

ANCONA, May 12, 1870.

DEAR SIR:—In answer to your communication dated the 23d February, ultimo, requesting me to give information respecting intoxicating drinks used in this country, and their influence on the people, though only a short time living here, I have been able to form the following ideas.

The Italian people as a body are not addicted to strong drinks. The principal drink of the country is wine, which is not intoxicating except when taken in great quantities. Spirits are only indulged in by the lower orders, and that in a very small proportion.

As for crime being committed under the influence of liquor, such a thing I may safely assert is unknown, and in case crime is committed under the influence of drink, in this country, it is taken as an extenuating circumstance in favor of the accused, a proceeding which is not always allowed in countries where intoxication is too prevalent.

The manufacturing and sales of liquors of all descriptions are perfectly free, government in no way interferes, nor is a license of any kind requisite for the sale or manufacturing of liquors.

You ask for a comparison of the amount of intoxication in this country and the United States. There is none; unfortunately the habit is too extended in the States to admit of a comparison with this country.

To sum up in a few words, intoxication as a general rule does not exist in this country, and in consequence the health and prosperity of the people are not in any way injured from the effects thereof.

I am, sir, very respectfully, your obedient servant,

ORRIN J. ROSE, *U. S. Consul.*

ATHENS, May 20, 1870.

SIR:—I have now the pleasure to reply to your circular letter of the 23d of February last, which, as I have before advised you, did not reach me until the 28th of April. You ask, 1st.—What are the chief intoxicating articles used in Greece?

The chief intoxicating article is wine; the native growth of the country. It is of pure grape juice, fermented naturally in barrels, without any artificial aid beyond the addition to the fresh must when put in the barrels, of about ten per cent. of common resin gathered from the bark of the pine-tree. This wine is very cheap, costing about thirty leptas an oke, or 15 leptas a bottle (say three cents). But little is exported, and that chiefly to Turkey and Russia. It may be said to be the universal drink of the people.

The average annual consumption in the city of Athens,—which contains a population of nearly 50,000 souls,—is about 1,900,000 okes of resined wine or 3,800,000 bottles. Of other spirits the estimate is 40,000 bottles. Rum and brandy are chiefly consumed by foreigners, of whom the greater part are sailors. The Greeks consume also, in small quantities, a spirit called raki, which is distilled from the lees of wine and from figs. Alcoholic drinks, spirits, rum, etc., are very deleterious in these warm climates. This fact, and the comparative high cost of these stimulants, limit their consumption. The light wine of the country on the contrary is generally regarded as harmless in its effects, if not positively wholesome, when drunk in moderation. A medical gentleman who has had large experience among the peasantry, informs me that “when not abused the tonic effect of the resined wine is rather beneficial than otherwise, its bitter pungency acting against the feverish influences of the summer miasmas.” “In the village of Menidi near Athens,” says my informant, “I know an old priest who, from the testimony of his neighbors, has consumed daily, ever since he was an adult, no less than two okes (four bottles) of the wine of the country at each of his meals, besides extra glasses at odd times, making in all about six okes or twelve bottles per day. This man is now ninety years old, is hale and strong and continues the same practice still.”

2d.—What amount of crime is produced by them and their effects on the health and prosperity of the people?

It is very difficult to make an estimate of the amount of crime produced by intoxication, where no statistical information on the subject can be obtained; but from what has been already stated with regard to the character and use of the wine of Greece, you will infer that, as a general thing, crime cannot be attributed to this cause. So far as figures go it may be assumed that not more than one-sixteenth of the crime committed can be said to arise from intoxication. The Greeks are eminently a temperate people, and excepting on high feasts and holidays, a drunken man is rarely seen. My own observation is not a fair test as I am not frequently in quarters of the city where tavern brawls occur, yet it is worthy of remark that during two years' residence in Greece I have not seen as many as two Greeks in the condition called “dead drunk;” while it is a not uncommon sight to see sailors from foreign ships, reeling through the streets in various stages of intoxication. Drinking may occasion brawls and quarrels leading to high words and much volubility of speech,—for the Greeks are easily excited and much given to profuse language,—but I may say they seldom come to blows or to worse results, such as homicide, in consequence of excessive drink-

ing. This is to be attributed, chiefly perhaps, to the quality of the liquor drank, the wine of the country, as has been already stated, not having the same effect as spirits in this respect. The Greeks also are an orderly people, easily excited to anger it is true, which, however, is but momentary. The following return of deaths in the city of Athens (taken from the published register), during the last nine years, will show what an astonishingly small amount of deaths were due to strong drinks or delirium tremens. You will observe the proportion of foreigners is very great. These form scarcely one per cent. of the whole population, and the result is owing to the strong alcoholic drinks which they consume, while the Greeks, as a rule, confine themselves to the light wine of the country.

Registered Deaths in the City of Athens from the effects of Strong Drinks, "Encephalopathie Crapuleuse" and "Delirium Tremens."

YEARS.								Natives.	Foreigners.	Total.
1860,	.	.	.	.	.	.	.	2	1	3
1861,	.	.	.	.	.	.	.	4	3	7
1862,	.	.	.	.	.	.	.	2	2	4
1863,	.	.	.	.	.	.	.	3	1	4
1864,	.	.	.	.	.	.	.	4	1	5
1865,	.	.	.	.	.	.	.	5	2	7
1866,	.	.	.	.	.	.	.	—	2	2
1867,	.	.	.	.	.	.	.	2	3	5
1868,	.	.	.	.	.	.	.	1	1	2
1869,	.	.	.	.	.	.	.	3	—	3
Total in a population of 50,000, . . .								26	16	42

This statement may not be perfectly reliable owing to the fact that the certificate which must be given by the physician, before permission for burial can be obtained, is sometimes incorrect. It may happen, when the cause is habitual intoxication, that sensitive relatives induce the physician to call the disease by some other name. It is, however, well known that cases of delirium tremens are so very rare in Athens, as to excite the astonishment of the medical faculty who are unacquainted with the country.

3d.—What is the relative amount of intoxication in Greece and in the United States?

The relative amount of intoxication is very small indeed compared with that of most other countries. There are no statistics of intemperance in Greece, but from what has already been said you

will perceive that there is no comparison whatever in this respect with the intoxication and intemperance which prevail in the United States. Probably there is less intemperance in strong drinks here, than in any other part of the world, unless it be in Turkey and other Mussulman States.

I remain, sir, very respectfully, yours,

CHAS. K. TUCKERMAN.

BASLE, SWITZERLAND, 8th June, 1870.

DEAR SIR:—Your letter, making inquiries in regard to a subject to which I paid a great deal of attention, owing to its great vital importance in the United States, viz., the cause of temperance, I received in due time; the very wish to answer it fully, supported by documents of official statistics, caused my delay in writing to you sooner. Some two months ago I tried to get official information from the canton of Berne, where, owing to peculiar circumstances and laws, strong alcoholic liquors (schnapps) are manufactured and consumed, and where there is more immorality, crime and misery, it is said, than elsewhere in Switzerland; but failed to receive it up to this day.

Hence I answer the questions desired as best I can from my own observation and study.

Question 1st. What are the chief intoxicating articles used in Basle and vicinity?

Answer 1. This being a border state of France and Germany, where wine grows very abundantly, and costs retail from 10 to 25 cents a pint only, a great deal of wine is consumed even by poor persons and day-laborers (wood-cutters receive a bottle a day, servants from two to three bottles a week in each family). Beer is more of a luxury, and indulged in more freely by the middle and higher class, besides wine, every day, Sunday not excepted.

Question 2. What amount of crime is produced by these intoxicating drinks, etc.?

Basle is one of the most orderly, quiet and moral cities in Europe, I believe, and one of the richest of its size. In its vicinity there are immense silk ribbon factories. The higher and middle classes enjoy excellent health, and are prosperous.

The working classes, gaining small wages, consume proportionately a good deal of cheap wines as a substitute for more substantial food, such as meat, which factory people obtain, perhaps, only once or twice a week.

There is nothing like the same amount of intoxication witnessed here as in the United States, or other countries, where strong drinks are resorted to instead of wine or beer, and is always of less dangerous consequences, rarely leading to fighting, if ever to murder. Drinking is here connected with amusements, conversations, music, etc., indoors and outdoors; does not take place at bars, or secretly.

I am, very respectfully, your obedient servant,

J. C. ERNI, *United States Consul.*

LEGATION OF THE U. S. OF AMERICA IN SWITZERLAND. }
BERNE, July 27th, 1870. }

SIR:—Your circular letter, asking for information respecting the use and effects of intoxicating liquors in Switzerland, was received at this legation in April last. At the time, I was absent on leave from the State Department, and, on my return, about the 1st of June, I began making inquiries with the hope of collecting materials for a satisfactory reply to your questions. Considerable time has elapsed, and I regret to say that I have been able to obtain only very insufficient data for this letter. The evils consequent upon the intemperate use of intoxicating drinks have not attracted as much attention here as in the United States, perhaps for the reason that they have not been as seriously felt. Nevertheless, in some parts of Switzerland, and especially in the canton of Berne, intemperance prevails to such an extent, that recently, the cantonal legislation has sought to find measures for abating the evil.

The few statistics that I have been able to collect on the subject of the use of intoxicating drinks in Switzerland relate to the canton of Berne. That canton, however, includes a fifth part of the population of Switzerland, and it is the part of the country where, I am assured, the greatest amount proportionately of intemperance is found.

Your first question is: "What are the chief intoxicating drinks used?" These are wine, beer, and a species of brandy, or schnapps, distilled from potatoes, or from the pulp of grapes after the wine has been pressed out. French brandy, or kirschwasser, and various liquors imported from abroad, are also used to some extent, but very little by the mass of the people.

From official sources, I learn that the annual average importation of wine, beer and cider, in the canton of Berne, which contains a population, in round numbers, of 500,000, amounts to from eight to nine million maas (a Swiss maas is equivalent to one quart and three gills English measure). A large quantity of beer is manufactured in

the canton, but I have not been able to obtain the approximate amount. There is also manufactured from the vineyards of the canton about 1,750,000 maas of wine per annum. The annual importation of brandies and other spirituous liquors reaches about 700,000 maas, and about the same quantity of spirits, principally schnapps or potato brandy, is distilled annually in the canton. The greater part of all the above-mentioned drinks is consumed within the canton. But little is used except for drinking purposes. After making due allowance for the large consumption by travellers during the summer months, there still remains sufficient ground for the conclusion that the people of this part of Switzerland are not the most temperate people in the world.

Your second question is: "What amount of crime is produced by the use of intoxicating drinks, and their effects on the health and prosperity of the people?" Upon this subject, I sought for information from the Federal Bureau of Statistics, the chief of which, in reply to my application says: "We have no statistics on the subject. It may, however, be taken as granted that manslaughter and many acts of violence are frequently the result of intemperance. In cases of suicide, without considering other causes, many persons destroy themselves while in a state of intoxication. Of fifty-three suicides in the year 1868, eleven were intoxicated when they committed the act, or were notorious drunkards. In this canton, as elsewhere, one may see that the health and prosperity of those who have fallen into the habit of drunkenness are soon destroyed. Many families are ruined by this vice, and the children of drunkards tainted with hereditary disease."

I am told that the evil effects of intemperance here are chiefly visible in that class of the population addicted to the drinking of schnapps. This liquor is very cheap, and is the principal stimulant used by the poorer classes. Its manufacture and use have greatly increased of late years. It is drunk by the people of the rural districts, who either cannot afford or cannot obtain other liquors. Since Switzerland has been traversed by railroads, and is annually visited by multitudes of foreign travellers, the prices of all kinds of country produce have largely increased. The poor classes are not as well fed as formerly. The excellent milk of the country, formerly consumed by the people, is sold to the hotels, or manufactured into cheese for exportation. Many of the people live almost exclusively on potatoes, and a writer on the subject, whose essays have attracted a good deal of attention here, Mr. J. F. Schneeberger, of Berne, attributes the craving for alcoholic drinks, so much more noticeable now than formerly, to the lack of nutritious and proper food.

The general impression among those with whom I have conversed on this topic, is that the wines of the country are wholesome, and that the best method of introducing a temperance reform would be to bring wine or beer within the reach of the masses of the people, and discourage the use of stronger drinks. A very intelligent gentleman at Lucerne, a member of the cantonal legislature, with whom I conversed on this subject, said that some years since he had charge of enrolling the citizens of that canton subject to military service, and was struck with the difference between the people of certain valleys where wine is produced, and has always been a common beverage, and those of other districts where wine is not used, and schnapps is a common drink. The physical superiority of the former class was, according to his account, very striking, and the percentage of able-bodied men in the wine-producing districts very much the greater. He attributed the difference, in great part, if not to the positive virtues of wine as a beverage, at least to the positive evils produced by schnapps-drinking. Nevertheless, I suspect there were other causes. In the wine-producing districts there is usually a more generous soil, a milder climate, and more wealth among the people, who are consequently better housed and better fed, and might be expected, as a consequence, to exhibit, in their persons, the superiority which he remarked.

Last year two laws were enacted by the cantonal legislature of Berne, one having for its object the restriction of the use of distilled spirituous liquors, by increasing the tax on their manufacture and importation, and diminishing the taxes on wine and malt liquors. The other seeks to protect the public from adulterated liquors, provides for the inspection of distilleries, in order that only such apparatus shall be used as will produce an article as little injurious as possible, and affixes penalties for the violation of the law. A small tax still remains on imported wine and beer, and it is proposed that this shall be repealed in order to encourage the substitution of such beverages in place of stronger drinks.

Some efforts have been also made to counteract the immoderate use of strong liquors by the private and voluntary action of citizens. A temperance society was formed in the city of Berne several years ago. The members abstain from distilled liquors, and the society publishes prize essays for the instruction of the people in regard to the injurious effects of the immoderate use of intoxicating drinks.

You request me, finally, to give my opinion as to the relative amount of intoxication in this country and that seen in the United States. As my residence here has been comparatively brief, and my opportunities of seeing the common, every-day life of the people

somewhat limited, my opinion is liable to be erroneous. Judging from what I have seen, I must say it is my impression that, while the drinking of intoxicating liquors is much more general here than in the United States, there are fewer instances of actual inebriation than are witnessed there. As far as my observation has extended, it is not so common to see men reeling or noisy, under the influence of intoxicating drinks, upon the streets here, as in most parts of the United States with which I am familiar. In all the towns of Switzerland there is a market day once in each week. Almost the whole rural population of the vicinity seem to visit the city on that day. The cafés and restaurants are filled with people; there is apparently a great deal of drinking, and towards night, it is not unusual to see occasionally a person intoxicated. But I think that, under similar circumstances, much worse results would be witnessed in the United States than are seen here on such occasions. This is perhaps due in part to the fact that the people are in general of a less excitable organization than ours, and in part to the fact that the American custom of "treating" is but little practised here.

Regretting that I have not been able to collect more complete statistics upon the subject,

I remain, very respectfully, yours,

HORACE RUBLEE.

BERLIN, April 26th, 1870.

MY DEAR DR. BOWDITCH:—I have your letter of the 18th ult. The German intoxicating drinks are made of brandy, distilled from rye or from potatoes. The "schnapp" is but such brandy or spirit distilled with sugar. The beer used here cannot be called an intoxicating drink. I have no opportunity of observing the people in their places of indulgence, and cannot offer an opinion of my own on "the relative amount of intoxication in this country." Those of whom I inquire do not think the health and prosperity of the people greatly injured by the use of spirituous liquors.

I am ever, most truly yours,

GEO. BANCROFT.

BREMEN, May 7th, 1870.

SIR:—An answer to your *first* interrogatory contained in your favor of 23d Feb., will necessarily answer your second, namely: "What are the chief intoxicating articles used in Bremen and

vicinity?" No intoxicating or alcoholic spirits are used in Bremen. Wines and beer are the favorite beverages, and are used and consumed in almost unlimited quantities. These are so cheap as to come within the means of all classes, more beer however being consumed by the middle and lower classes than any other. My observation has led me to conclude that no evil grows out of the use of these. For now, after quite a year's residence among the people here, I have yet to see the drunkenness and rioting which prevail in most of our American cities; the natural and consequent results from the sale and use of the intemperate spirituous liquors.

I am, very respectfully, yours,

R. M. HANSON, *U. S. Consul.*

U. S. LEGATION, CONSTANTINOPLE, May 27th, 1870.

SIR:—In reply to yours of February last I beg to say:

1. The intoxicating drinks most in use in Turkey are raki (popularly called *mastica*), and brandy. The former is simply rum flavored with mastic, to give it an aromatic taste. The rum was for the most part imported from New England, but this importation has now almost ceased, being undersold by the rum of Austria and France. Brandy and Cognac are imported from France England.

2. The use of intoxicating drinks is confined to the Christian populations, and of these the Greeks are the most addicted to them. Even among those who indulge in spirituous liquors intoxication is very rare, and habitual drunkenness is comparatively unknown. Sobriety is the rule and intemperance the exception. Drunken men are seldom seen in the streets of this city, and when a case occurs, it is generally a foreign sailor. The English sailors, I am sorry to say, are conspicuous for drunken habits on shore. Their intemperance is a fruitful source of outrage and crime.

The Mohammedans by religion and habit are temperate, and they regard drunkenness with aversion, as degrading to human nature. They abstain as a rule, from the use of intoxicating drinks. None are sold in their *cafés*, and by imperial authority they are not allowed to be offered for sale in the vicinity of the Imperial Palaces, government offices, kiosks frequented by the Sultan, and the military barracks. At the review held last year on the plain of Hun-kiair Iskelepi, of 30,000 Turkish troops before the Sultan, the Empress Eugenie and the Emperor of Austria, and in the presence of 50,000 spectators, not a drop of liquor was sold in the *cafés* and

refreshment tents. Not a single drunken man marred the order and decency of the scene. It has never been my lot to witness a more respectable and decorously behaved multitude. The same good order prevails at all Turkish festivals.

I regret to be obliged to admit that Mussulmen exhibit a vast superiority to Christians in their abstinence from intoxicating drinks.

3. I have no means of furnishing you reliable data as to the amount of crime produced in Turkey by intoxicating drinks, as no statistics are collated here, except a few on commercial matters. I am safe in saying, however, that it is inconsiderable. The habitual use of ardent spirits in this country leads to gastric fevers, to apoplexy, paralysis, and a rapid decay of physical and mental health. He who is careful of his health abstains from them altogether, total abstinence being the wisest and safest rule.

I think it proper to add that wines, native and foreign, are cheap, and in general consumption among Christians. When not adulterated by drugs, and drank moderately at meals as beverages, they are regarded by physicians as wholesome in their influence.

I am sir, very respectfully, your obedient servant,

E. JOY MORRIS.

CONSTANTINOPLE, TURKEY, July 12th, 1870.

SIR:—Your letter of inquiry as to the varieties of wines or spirituous liquors used in Greece, and their apparent effect upon the character and behavior of the people, was received two months since.

Immediately after I commenced a somewhat extended tour in the Peloponnesus and islands, and found neither opportunity nor leisure to furnish the information you desired.

And now I can only give my own impressions, formed after such inquiries as I have been able to make, and subject to mistake. Should I be able hereafter to get at any more definite facts I will make it a duty to communicate them.

First,—the kind of intoxicating liquors used in Greece is almost exclusively wine.

There are manufactories of rakée at Calamas, and at other places in the Peloponnesus, but usually the people prefer to drink the wine, and only take the rakée when much exhausted, as a stimulant.

I have never seen in an eight months' residence in Greece, a man make himself drunk with rakée. This rakée, it should be said,

is exceedingly strong. As to the Greek wines, probably they are purer than those of any other country in Europe.

When one becomes habituated to the resinated wine, which is the common drink—the poorer people liking no other so well—he discerns the purity of the wine from all other admixture, and under the cloak of the resin can distinguish easily the different grapes from which different wines have been made.

The proportion of resin varies from $\frac{1}{4}$ of 1 per cent. to 5 per cent. Its addition is considered to make the wine more healthy, to facilitate digestion, and to counteract any ill effects which the lime-water of the country may have.

Passing the other day, from Athens to Smyrna, as soon as I tasted the light wine of that country, I could perceive the spirit in it to a degree which I had not known in Greece. There is perhaps no country in the world where wines are cheaper than in Greece. New wine is sold in Arabia in the fall for four or five cents per gallon. Before the grape disease of '53, '54, '55, '56, &c., there were times when it was sold for one or two cents. On the high plain of Arcadia, and in the mild valley of Acarnania—in fact in all of western Hellas—wine with bread and olives and oil makes a chief article of food; babies, even, drink it.

It is the most abundant of all products, and the easiest procured. In Acarnania you will often find wine when you would hardly find bread.

I should say that from the purity of the wine used, that an excess of it caused little injury to the health, and ready as the Greeks are to quarrel, I am inclined to think that comparatively few quarrels take their origin in drink.

I believe that ten per cent. would be much above the proportion of crimes of all sorts, directly or remotely connected with the use of wine or spirituous liquors. During my residence in Greece, and my travels in it, I have scarcely seen half a dozen drunken men.

I am, sir, with great respect, obediently yours,

ROBERT P. KEEF,
U. S. Consul Piræus, Greece.

N. B.—The rakée in Greece is usually made from figs.

CADIZ, April 20, 1870.

DEAR SIR:—Your favor of the 23d of February last is received, and I will try to comply with your request as far as I know.

The chief intoxicating articles used in Cadiz and vicinity are:

cherry wine, burgundy and aguardiente; this last is the whiskey of Spain.

No crime whatever is committed on account of drunkenness; the Spaniards do not generally drink, and the only cases of intoxication belong to foreigners coming here as sailors, and to them alone is attributed all disturbance of peace. As far as I have been able to see, the intoxication leads those foreigners to quarrels and fighting, but nothing more, and permit me to inform you, that in my opinion either of the above liquids have on the inhabitants of this part of the country the effect to make them indolent; this, however, may come on account of the climate. No Spaniards carry on here any business of any importance, but, however, they are all in an easy social position. The people living in the country drink a good deal of aguardiente, which is the most dangerous of the above liquids mentioned. This aguardiente is of a white color, but not exactly, having a yellowish appearance, and its taste is very much like annisette. I have remarked often, as soon as these people have drunk sufficiently of this liquid, they were led to cheerfulness, and after to a complete state of indolence; but I never saw one in a state of intoxication. It is also the favorite drink of our sailors coming here. Now there are many robberies committed in the mountains, but the robberies and crimes which may be committed by brigands are committed in cool blood, as never or very seldom have they been found with any intoxicating liquid even in their camp. The health is generally very good, and in a population of 60 to 70,000 inhabitants, the daily average of deaths is three to four per day. Cherry wine and burgundy are the only wines shipped to the United States, of which the greatest part goes to New York, Philadelphia, New Orleans and Boston.

Very respectfully, yours,

A. N. DUFFIE, *United States Consul.*

UNITED STATES LEGATION, COPENHAGEN, }
2d May, 1870. }

DEAR SIR:—On the receipt of your favor of the 23d February, only a few days ago, I sought an interview with Mr. C. N. David, Chief of the Bureau of Statistics in Denmark, and one of the best authorities upon all such subjects in Europe.

I left with him a copy of your letter, and now enclose you his letter to me of the 30th April. As his statistics cover the period since the severance of the Duchies of Holstein and Schleswig, they may be taken as applicable to what is called "Denmark proper," and therefore, a population, I believe, of about 1,600,000.

In conversation with me, Mr. David deemed it extremely difficult, indeed impossible, to say what proportion of crime is caused by the use of intoxicating drinks. He only speaks certainly and confidently of suicide; but as to the general list of crimes, I take his impression to be that intoxication does not have here so marked an effect as it is generally supposed to have in the United States. Still he is very cautious to say that accuracy cannot even be approached on the subject.

He informs me that the quantity distilled, and the average consumption per head, are much greater than twenty or thirty years ago; but, with his accustomed caution, he adds that in making this statement, he speaks from official figures, and that the law affecting the manufacture being now stricter and better administered, he cannot say how far the estimate would be affected by former clandestine distillation, which is now very rare.

He assures me that while the average consumption has thus seemed to increase largely, the number of cases of manifest and public intoxication has greatly decreased; which he attributes partly to improved manners, morals and education, but mainly to improvement in the quantity and quality of food the people use, believing that well-fed people can support more alcoholic stimulus than poorly fed people.

He thinks the tendency and habit of intoxication somewhat greater in the cities than in the rural and agricultural districts.

In reference to retail sale in small quantities, there are two sorts of license: one to sell, with permission to use on the premises; and the other to sell, without such permission; and he thinks the permission to remain and use the liquor on the premises much more injurious to the purchasers. Practically there is no difficulty or impediment whatever in the way of those who want it, and are able to pay for it. He did not discuss prohibition at any length, but does not seem to regard it as an efficient remedy, and intimated an opinion that it would only increase the clandestine manufacture, sale and use.

Beer is very largely used here, as elsewhere in Northern Europe, but is not deemed an intoxicating beverage. It is said to be not nearly as strong as English beer, and I think is not so strong as that made in the United States.

The strong drink, or "brandy," is mainly distilled from barley; potatoes were formerly much used, but have been very little used since the appearance of the potato disease some years ago.

I cannot give any definite or intelligent opinion of the relative amount of intoxication here and in the United States, especially in

the N. E. States, where I have seen so little of the people. There is certainly much less visible and outbreking intoxication here than in those parts of the United States where my opportunity for observation has been best; but on the other hand, I must admit my surprise at the large aggregate and average consumption shown by Mr. David's figures. The people of this country are remarkably quiet, steady, peaceful, plodding and law-abiding; given to much out-door and open-air congregation and amusement, but always with an order and decorum that have commanded my admiration. It is possible that owing to these manners, and to the climate, the same amount of intoxication would not be so much seen and heard here as where I live.

Very respectfully, your obedient servant,
GEO. H. YEAMAN.

COPENHAGEN, 30th April, 1870.

By returning the included letter of Mr. Bowditch of Massachusetts, I have the honor to communicate to your Excellency a notice concerning the produce of the home-distilleries in Denmark in the years 1864-1868, and the importation of brandy, or a kind of rum, from abroad, during the same five years.

Y E A R S .	Home Distilleries.	Exported.
1864-5,	34,753,000 pots.	1,498,000 pots.
1865-6,	35,794,000 "	735,000 "
1866-7,	33,071,000 "	1,045,000 "
1867-8,	31,614,000 "	1,141,000 "
1868-9,	32,632,000 "	864,000 "

Five pots are about 1 gallon. The home distilleries produced on an average 33,570,000 pots, or about 6,700,000 gallons, of which 1,257,000 pots (250,000 gallons) yearly are exported.

Y E A R S .	Importation of Brandy.	Re-exportation.
1864-5,	1,500,000 pots.	249,000 pots.
1865-6,	2,408,000 "	596,000 "
1866-7,	2,137,000 "	453,000 "
1867-8,	1,875,000 "	481,000 "
1868-9,	2,486,000 "	837,000 "

On an average, 2,080,000 pots of foreign brandy were imported (416,000 gallons), of which about 520,000 pots (104,000 gallons) were re-exported.

No doubt that this large consumption of intoxicating drinks in Denmark, as in other countries, has a very lamentable influence upon the moral and physical constitution of the people, though the state of the climate and the nourishment of the people, in accordance to its better condition and common welfare, to a certain degree, can mitigate this obnoxious influence; but it is in my opinion impossible definitely to ascertain the amount of crime and the deplorable effects on the health and prosperity of the people, which can be ascribed to the consumption of intoxicating drinks.

The sole fact, which I think in this respect can be quoted, is that among 100 self-murderers—and the number of self-murders is very large in Denmark,—according to the inquests of the coroners, 26.5 are declared “drunkards,” or “fallen into the abuse of drinking,” say for men 32.6, and for women, 8.7.

Your Excellency, most obedient,

C. N. DAVID.

To His Excellency, G.H. YEAMAN, *Minister of the United States.*

COPENHAGEN, 4th May, 1870.

DEAR SIR:—Since my letter of the 2d inst., it has occurred to me that the information was not so full upon the subject of *health* as you might have expected, but I do not find that I can make it much more explicit.

I have to-day sought an interview with Professor E. Fenger, formerly at once a leading medical practitioner in this city, a medical teacher in the university and in charge of one of the principal hospitals; and who has since devoted himself very much to all sorts of statistics, and is now acting as president of the principal life assurance company of this kingdom.

He agrees with Mr. David that there are very few reliable statistics on the subject, except in relation to suicide, which having been unusually and painfully frequent here, led to inquiries as to the causes.

He thinks that intoxication or excessive drinking often superinduces chronic diseases of the liver and kidneys, and at other times leads to dropsy and diseases of the bowels, but he does not think any accurate figures or proportions can be given.

He regards the consumption here as “very large,” and when I referred to the general opinion that it is much larger in Sweden and Norway than here, he replied that he believed the consumption

[illegible]

Regretting my inability to furnish you with fuller and more detailed information, I remain,

Very respectfully, your obedient servant,

GEO. H. YEAMAN.

COPENHAGEN, 5th May, 1870.

DEAR SIR:—I should perhaps make a correction in that part of my letter of yesterday relating to the lunatic asylum for Copenhagen. I used the expression “attributed to intoxication.” In the printed tables the word “drik”—drink—only is used; and I cannot tell whether those who made the estimates and framed the tables of causes used this word to express the habit of drinking or the habit of intoxication. But as it is quite possible for a man habitually to drink too much without ever getting really drunk, they may have had in view only the habit of drinking too much.

I would add that the population of the city is about 170,000, and that but few cases are admitted into the asylum from other provinces.

Very respectfully, your obedient servant,

GEO. H. YEAMAN.

P. S.—In regard to the increased prosperity of the Danish people of which I have spoken, and of which there seems to be no doubt, it ought to be mentioned that several important facts have concurred with it, and, no doubt, have contributed to it.

Among these I would now only mention the improved condition of land tenure and distribution, as well as improved agriculture, greatly enlarged political franchise and improved educational facilities. There is, perhaps, no country in Europe, except Prussia, where the average standard of education and intelligence is so high as in Denmark—very nearly approaching in these two countries the standard attained in those States of the Union where the system of public common schools has been long established. I have said that agricultural laborers eat five times a day. The statement is true of the entire laboring population, except, perhaps, the household domestics of the upper classes. Well-to-do families have generally four meals, or two meals and two refreshments, which may be called in English, coffee, breakfast or lunch, dinner and tea. Even the inmates of the “poorhouse” eat five times a day, but are not furnished with the “brandy.”

G. H. Y.

UNITED STATES CONSULAR AGENCY, }
COLOGNE, 8th July, 1870. }

DEAR SIR:—Your letter of the 23d February last has been duly received, and in reply I beg to express to you my sincerest regret that I have not succeeded in answering your questions in the way I wished to be able to do, although I endeavored to get information everywhere.

The chief intoxicating drinks used in this country are beer and brandy, and in the vine countries the most inferior descriptions of wine; however, it is particularly the brandy which produces the most disadvantageous influence on the health and prosperity of the people. From the inclosed communications, which the Board of Health of the Nether-Rhine at Dusseldorf has kindly given me on my application, you will learn that there are no official statistics existing in this country with regard to the amount of intoxication and of crime resulting therefrom, but it may be taken for granted that nearly seventy-five per cent. of the number of criminals have committed their crimes by the influence of intoxicating drinks.

I may still add that a correspondence has taken place on the matter between the said Board of Health and Dr. Varrentrapp of Frankfort-on-the-Main, who is an experienced man in the branch of prison matters, and that he was likewise unable to answer fully your questions, but being about to send some books to Boston he promised to add some pamphlets referring to the matter for you, which I have every reason to believe he will have done.

I remain, very respectfully, yours,

GEORGE HÖLSCHER, *U. S. Consular Agent.*

Mr. Hölscher subsequently forwarded the following documents:—

(TRANSLATIONS.)

SIR:—Allow me to answer your very kind letter of the 20th of this month. The question raised in the royal ministry in regard to statistics concerning “what influence the use of intoxicating drinks had on the number of committed crimes,” was not taken into consideration particularly, and other official statistical statements for judging this question are unknown.

The Chief Procurator, (Signed,) BÖLLING.

COLOGNE, April 27, 1870.

COLOGNE, May 13, 1870.

SIR:—I have the honor to answer your very kind letter of the 6th, and regret very much that I am unable to answer your inquiry in regard to the statistical information of “what influence the use

of intoxicating liquor has on crimes," and can furnish you no materials. It is generally known what a powerful influence it exercises, and for this in particular all institutions for correction are in the same position. To prove facts in different ways with the multitude of examples there are, so far as I know, no statistical proofs, and if there are such in existence, they are to be regarded only as not even approaching the truth; the difficulty in presenting them does not need any further explanation. So far as regards the institutions of punishment, I am unable to give you any statistical information, though for the last twenty years I have spent my time in works of statistics, particularly in relation to improvement in institutions of prisons very minutely.

The Director, VON GOTZEN.

To the Superintendent of the Society }
of Public Health, Dr. Lent. }

COLOGNE.

DR. LENT:—You honor me with your letter of May 17th, referring to the letter of our Agent, Pastor Schiffer, of May 7th. Allow me to answer.

All the gentlemen connected with the Institutions of Punishment, the Directors, Inspectors of our provinces, to whom we addressed ourselves—namely, the President of the State Commission of Health of the United Provinces, for the purpose of finding out what influence the use of intoxicating liquor has in the amount of crimes in this country, answer as follows:

Proper statistical material was not communicated, and is very difficult according to the nature of the matter, because in many institutions the personal acts of the imprisoned are not brought forward, and the experience of a few does not give sufficient standpoint to make statistical results.

We have the honor to collect the information of single institutions.

The Director of the Institution for Correction at Herfordt, communicates that in the House of Correction, in the Province of Westphalia, where there are the most Protestant prisoners, minute statistical notices are not extant. It would come very near the truth to say, that seventy-five per cent. of the crimes of prisoners, particularly murder, manslaughter, resistance against authority, criminals against morality, assault and battery, thieving, house-breaking, and even a higher percentage of some of these crimes can be traced to intoxicating drink. In Munster a great penitentiary, where there are from 600 to 700 Catholic prisoners, only since February when the new Director came, have they begun to collect such notes. For this an answer is not possible.

The Director of the Central Institution at Hamm, A. L., where there are from 400 to 500 prisoners, communicates the fact that two-fifths of the cases of assault and battery were due to the influence of liquor. The Inspector of the prison on the Spaumberg, near Bielefeld, where the prisoners aggregate 70 or 80 per day from the district Minten, says one-third are punished for stealing, one-sixth for heavy assault and battery, one-sixth vagabonds, one-sixth for loafing and insulting, and the last one-sixth for depredations. With the exception of youthful thieves, the use of intoxicating drink was the direct or indirect cause of nearly all this crime. The Director of the House of Correction at Benninghausen, answers that he has no statistical material; still the report of the Director of Brauweiler and our own experience show, that without exception beggars and vagabonds come in this way.

We observe still, that besides the above named Institutions, there are a great number of prisoners whose time is three months.

Regarding the Rhenish Provinces, we did not receive any information from the Director at Werden, he having been there only two months.

The Superintendents at Dusseldorf, Cleve, Bonn, and Coblenz, regret not to be able to give any satisfaction.

The Director of the Cologne Institution answered that he sent you his report as asked. The Director of the House of Arrest, in Aachon, estimates according to his experience, the number of persons made criminals in consequence of intoxicating liquor, at 75 per cent.

From the report of the Inspector of the House of Arrest, whose daily statements are about 200 prisoners, it is found that 75 per cent. of the imprisoned became criminals by brandy. Not only grown persons, but youths and even the female sex, are not excluded from it. Young persons from seventeen to eighteen years of age, and old men after being dismissed, are brought in again for new crimes, entirely drunk on the next day.

On dismissal the prisoners are *saluted*, partly by their parents, partly by their male and female friends, with a bottle of schnapps at the very gate of the Institution. Of those who have been deprived of their liberty, and present themselves for punishment, hardly one is sober, and almost daily, because entirely drunk, they are sent off again. The excuse, "Yes, he is a very good fellow, but he likes to drink," parents do not hesitate to say of their children of tender years.

The Director of the Institution for Correction at Tsier, where prisoners are retained one-quarter in the House of Correction, and

three-quarters in jails, reports that of 1,091 prisoners for 1869, brought in to undergo punishment, 380 were punished for assault and battery, indecent exposure, destroying property, and as nuisances in the street. Beer and brandy are not much drank; on the contrary *very* much cheap wine, or cider called "tietz" is used, just as much intoxicating as any other intoxicating drink.

Among the 70 prisoners in the House of Correction, there are found 51 criminals among old men, seventy to eighty years of age, punished for lewdness, many of them with small children. Even here the excessive use of intoxicating liquor can, with certainty, be regarded as the cause of this crime.

SIR:—In response to your kind letter of the 14th of this month, I have the honor to say, that I am not in the position to furnish you with statistical notices on the question of "what influence does the use of intoxicating drinks have in the number of crimes in this district?" There is no doubt, that the excessive use of spirituous drinks, particularly schnapps, in one word, drunkenness is the cause of the imprisonment of the greatest part of the inhabitants of the institutions for males in this place.

A great number have by the excessive use of schnapps, been broken down morally, so far that they ignore entirely the duty imposed by the Creator on every man, to earn his living by work, and they prefer rather to be beggars and vagabonds.

Another part, among whom I count mechanics, are ruined in consequence of this vice, so far that they are no longer able to fulfil the moderate expectations of the trade. Such individuals are found regularly on the travel, but they do not have the will to accept work, but go about begging, to satisfy their appetite for drink. They succumb to the law.

Again, there are others, who by excessive use of schnapps, are not able to perform even the lightest kind of work. Homeless, they are loafing about, and at last for want of support they are imprisoned and punished.

To this class also belong fathers of families, who do not use their daily wages for the support of their families, but spend them for schnapps, and let their families suffer. According to law they are subjects for imprisonment, and liable to be sentenced.

I repeat that schnapps in most cases is the cause of vagabonds beggars, and being without homes. How much the vice of drunkenness can captivate a man, in other words stick to him, can be proved by the fact, that most persons imprisoned here, have nothing else to do, as soon as they are set free, than to quickly find a *rum-hole*, and

with a real rapacity fall upon this devilish drink, after having been deprived for months, and even years.

I am convinced that a great number of prisoners, if they have opportunity, would rather stretch out their hands for a glass of schnapps than a piece of coal.

The above sad descriptions are not all based on exaggerations, but they rest on my many years' experience, and are an imperfect picture of the naked reality.

With high esteem, yours,

MÜLLER, *Director*.

BRAUWEILER, May 25th, 1870.

We declare ourselves ready to contribute in the future, as far as possible further explanations on this point of law, and of society, which makes our work so difficult.

We sign with the highest esteem. The Committee of the
Society of Prisons of Rhenish Westphalia,

(Signed,)

SCHEFFER.

DUSSELDORF, June 23d, 1870.

DUBLIN, May 6, 1870.

DEAR DR. BOWDITCH:—Your letter dated March 8, was duly received, and the very day it reached me I placed your questions in the hands of Mr. Russell, the agent of the Irish Permissive Bill Association, a man of great zeal and ability, and who is, I think, better qualified to answer your inquiries than any one else I know of. He travels extensively through the country, and is a person of great intelligence. He promised, and I believe intended to reply very soon; but I suppose his numerous engagements prevented his doing so. I will keep him in mind, and will let you know as soon as I possibly can.

Yours, with great regard,

RICHARD D. WEBB.

The following is the reply of Mr. Russell, since received:—

Query No. 1.—"What are the chief intoxicating articles used in Ireland?" Amongst the poor and middle classes, whiskey and porter. Amongst the rich, wines and brandy.

It has been found of recent years that ether has been used to a very considerable extent in several northern towns, notably in Draperstown and Maghera.

Query No. 2.—"What amount of crime is produced by them, and their effects on health and prosperity of the people?"

In 1868, the last year for which I have “judicial statistics,” 76,000, men and women, were charged before the magistrates throughout the country on the ground of drunkenness, Dublin, with a population of 250,000, contributing 16,000.

With the exception of the class of crime known as agrarian, near the whole crime of Ireland is due to drink.

TESTIMONIES ON THIS HEAD.

“The cases which will come before you originated entirely in the indulgence of intoxicating drinks. If our poor people in this country were free from this vice, not a single case would come before you at these assizes. We have in Ireland less crime than in other countries; but it would be still further diminished if the indulgence in intoxicating drink was completely stopped, or at least far less practised than at present.”—*Mr. Justice O’Hagan (now Lord-Chancellor) to grand jury at Monaghan, 1868.*

“Our experience leads us to the conclusion that all the crimes we meet with on circuit are more or less, directly or indirectly, caused by drunkenness.”—*Mr. Justice Lanson to grand jury at Armagh, 1869.*

“I have been thirty years chairman of quarter sessions in several counties in Ireland. I have, perhaps, presided at more criminal trials than most men living, and I can truly say that I have had scarcely a case before me with reference to the class of offences known as against the person that was not the consequence of drunkenness.”—*Mr. M. O’Shaughnessy, Q. C., Chairman of Quarter Sessions, County Clare.*

The effects of drinking upon the prosperity of the people may be gauged by the following statistics. The consumption of drink has rather increased since 1865, but the figures given are all under the mark rather than above:—

Consumption and Cost of Liquor in Ireland, 1865.

Home-made spirits retained for consumption (gallons),	5,036,814
Foreign and Colonial,	“ 325,995
Wines of all sorts,	“ 1,208,233
Beer, (barrels),	1,538,209

Cost.

Home-made spirits, at 16s. per gallon,	£4,029,451
Foreign and Colonial, at 20s. per gallon,	325,995
Wines, at 15s. per gallon,	906,174
Beer, at 37s. per barrel,	2,840,187
	<hr/>
	£8,102,757

This expenditure, in proportion to the population, is greatly below that of either England or Scotland, but still it is enormous, being

at the rate of £1 9s. for each individual, or nearly £7 10s. for each family in the country.

It is £2,043,477 more than the value of the entire imports into Ireland, that being in 1865 £6,059,280

It is £1,318,217 more than the total revenue of Ireland, that being in 1865 6,784,540

It is nearly five times as much as the total receipts of the railroads in Ireland, that being in 1865 . . . 1,737,061

It is nearly eight times as much as the whole county cess of Ireland, that being in 1865 1,061,399

It is more than ten times as great as the entire sum voted by parliament for primary education, that being in 1865 336,770

And were these added together, the whole receipt of the railways, county cess, entire sums expended on poor relief and primary education, it would not amount to one-half of the sum expended on intoxicating liquors.

Sum expended on intoxicating liquors,	£8,102,757
Receipts of railroads,	£1,737,061
Grand Jury cess,	1,061,399
Poor rate,	731,851
Education grant,	326,770
	<hr/>
	3,857,081

Balance, £4,545,676

The poverty of the country is thus intensified by the drinking habits of the people.

I am not in a position to say what the results are upon the health of the people generally. But medical men are clear in their testimony that a very large percentage of the disease brought under their notice arises from drink.

T. W. RUSSELL.

ELSINORE, DENMARK, 3d May, 1870.

SIR:—I have the honor to acknowledge the receipt of your circular letter of the 23d February, making inquiries as to the influence of intoxicating drinks on the health and prosperity of the people of this country; and in reply to the several questions contained therein, I now beg to inform you.

1st. That the principal intoxicating drinks used in this country by the middle and lower classes of the population are beer and spirits

distilled from barley and rye, under the denomination of corn brandy. Under this head, I give you the statistics of the quantities annually consumed, as far as I have been enabled to collect them. They are as follows :—

Of home manufactured spirits (corn brandy), about 6,500,000 gallons.

Imported spirits,	. . . . .	450,000	“
Wines,	. . . . .	400,000	“

Of the exact quantity of beer consumed, I am sorry to say I have not been able to obtain any correct and positive returns, no duties or excise being levied on this article. From the information which, however, I have been able to get from intelligent brewers and others, I think it can safely be put down as at least twenty gallons annually for each head of the population. The principal brewer in this town has given me the amount brewed here and sold for consumption by the population of this town and the neighboring land districts; to say a population of about 12,000, and the quantity of beer sold about 275,000 gallons, and this would appear to confirm the calculation above mentioned of twenty gallons per head.

It must, at the same time, be borne in mind that the great part of the beer consumed is very thin and weak, as the prices will show, beer being sold here at prices varying from one to four cents per bottle.

Denmark has a population of about 1,600,000 inhabitants, which will give a consumption of about four and a half gallons of wines and spirits per head, and this added to the amount of beer consumed, will, in my opinion, give a heavy average amount of consumption as compared with other countries.

Strange to say, this large annual consumption does not seem to have any injurious effects on the health of the people. The Danes are a remarkably strong and hardy race, and the average duration of life will bear a favorable comparison with any country in Europe and is certainly superior to that of the United States. There is much less energy of character to be observed amongst the people generally here as compared with us, but whether this is to be attributed to effect of climate, or to the too great use of intoxicating drinks, I am not in a position to say. During my short stay in this country, I have been much struck with the general sluggishness and small amount of work obtained out of the laboring classes as compared with the same classes in the States, and I have been a frequent witness to the strange sights of ship carpenters, masons, house carpenters and other trades, knocking off in their work to take a drink out of their bottles of beer or spirits.

Cognizant as I have been of the large quantities of these drinks generally consumed here, I have been considerably surprised at the exceptional cases of intoxicated people I have seen, either in the streets of this town or in my frequent visits to Copenhagen, the capital of the country, and I have no hesitation in saying that I have witnessed a much greater amount of intoxication in the towns in the United States than I have in this country.

2d. As regards the amount of crime produced by the use of these drinks, I cannot find any statistical tables to supply me with such information, but I am told by the police magistrate of this town, that in his jurisdiction no cases of murder, homicide, or theft, that have ever been brought before him, could be traced to the influence of drink, and that even arrests for street disorders are very rare amongst the inhabitants, and chiefly confined to the foreign seamen frequenting the place.

As far as my own personal observations go, the Danes seem to be a remarkably peaceable and orderly people. There is no rowdyism to be seen in the towns, and the very few intoxicated people I have seen in the streets, seem to stagger along without making any attempt to molest the passers by. The very low prices of these articles in this country, say ten cents for a bottle of corn brandy, and one to two cents for a bottle of ordinary beer, accounts, doubtless, in a great measure for the small amount of poverty which might be expected from so large a consumption of intoxicating drinks.

I have the honor to be, your most obedient servant,

C. C. SHEATS, *U. S. Consul.*

CONSULATE-GENERAL OF THE UNITED STATES, }
FRANKFORT-ON-THE-MAIN, May 20, 1870. }

DEAR SIR:—I have the honor to acknowledge the receipt of your circular, dated February 28d, 1870, and now transmit a reply to the same.

I incorporate herewith, as a part of this reply, a communication upon the subject made to me by the vice-consul, at this consulate, who has resided in this vicinity nearly the whole of a long life, and who is very competent in every respect, being himself a German, to give an accurate history of the uses of drinks in Germany.

To your first inquiry: What are the chief intoxicating articles used in Frankfort and vicinity?

I answer,—wines, beer and cider. French brandies are used in very small quantities by some, but very rarely by native Germans. The qualities of wines used depend upon the rank, condition, means

and associations of the individual. The wealthiest classes use champagne in free quantities, sparkling Hock, the best Rhine wines, and the purest and richest Bordeaux wines. The middle classes use champagne and hock in small quantities, but generally drink light and cheap pure Rhine wines, and Bordeaux wines of a cheaper kind, and certain kinds of beer called "vien" and "Bairisch" beer. The poorer classes use a brandy made of potatoes, cheap and poor beer, costing about one-half as much as the beer known as "vien" or "Bairisch," and cider, all of which is drank very largely. Water is not much drank. To your second inquiry, "What amount of crime is produced by them? and their effects on health and prosperity of the people," I answer, that it is impossible to find any statistics of crime which go so far as to inform of the causes of crimes. Observation alone can enable any one to form an opinion of the proportion of crimes caused by the use of intoxicating drinks. I believe that but very little crime is committed in this part of Germany. There are few high crimes committed. An ordinary assault is very rare. Larceny is the most common offence. The surveillance of the police is searching and ever alert. People are restrained from the commission of crime by the fear of punishment, which is most certain to follow. Intoxication is very rare. During a residence of a year in Frankfort I have not seen more than five persons intoxicated. All of them were of the lowest order of laborers, and still not quarrelsome, but very hilarious and good-natured. I have seen no one stupidly drunk or as we say "dead drunk." I have seen no well-dressed person, nor any person claiming to be of a respectable condition or having any business or calling, whom I supposed to be under the influence of intoxicating liquor, in a noticeable degree.

Either from climate, temperament, mode of life, habits, or from necessity, the German seems to be of a quiet character. I can hardly say contented, nor happy, nor much more of a prosperous character. Originally, from the necessity of a common defence, they congregated into small, compact and ill-ventilated and badly planned and constructed villages; and now from choice they continue in the same old villages, instead of scattering along the lines of the highways; and from them every morning sally out the men and women (and more women than men) to labor in the adjoining fields, or to work in the near cities, spending the day upon a pittance of bread, and return at night into their village at dark to enjoy the only meal of the day, and to spend their evenings in smoking and drinking their beer in crowds or cliques.

The lot of the German laborer seems to be hard. He travels

miles to his daily work, he works hard, he fares most scantily, he receives very small pay for his labor, he returns at night tired, worn, weary, and in his house he finds no comfort, and yet he does not resort to intoxication for a relief from pressing sorrow or despair. He rises again, eager to go through the same routine. He commits no crime. He thinks of no evil. He expects to labor, and looks to nothing more, and for nothing more. He seldom complains, whatever may be his suffering. He receives but little, he subsists on little. His expectations are not great, and are cheaply and easily gratified.

They seem to be healthy, both the men and women. The women will do as much labor in the field as the men, and perform the same labor as the men.

I cannot say that the drinks now in common use add to or in any way contribute to the health and prosperity of the people of Germany. Neither can I say that the common drinks, such as beer and cider, seem to be injurious to the health.

If some kind of drink, beyond water, is to be used, the milder, the weaker, and the purer the drink the better. If coffee can be made satisfactory, it would seem to be the best drink. And I believe that the common hourly use of it in Germany keeps out of use a mass of intoxicating drinks.

I will add that the use of fancy mixed drinks is not known here. There is no standing at the bar to drink, and no bars to attract. You will thus see that the amount of intoxication in this country is much less than in the United States. I attribute the fact to the different kinds of intoxicating drinks in common use, and to the different ways in which those drinks are used.

In the city of Frankfort, with a population of one hundred thousand persons, intoxication is rare. Crime is rare. The health of the people is good. As a whole the people are prosperous. The habits of the people contribute greatly, if they do not wholly produce this state of things.

I take the liberty to send to you herewith certain statistical information in the inclosed pamphlet, which you may be able to peruse. I can find no similar information in any other form.

I have the honor to be, your obedient servant,

W. PRENTISS WEBSTER, *U. S. Consul-General.*

STATEMENT OF VICE-CONSUL.

The chief intoxicating article used in Frankfort and vicinity is the common brandy distilled from potatoes. Twenty years ago the city and country were full of dram-shops, which, owing to the im-

provement of the beer and the introduction of coffee amongst the laboring class, have nearly entirely disappeared. At that time the out-door mechanic, such as carpenters, masons, and those employed in factories, who live out of town, had merely one warm meal, which was the supper. Their breakfast, dinner and vesper consisted then of brown rye-bread, some home-made cheese, and common brandy. The latter was then taken in large quantities, and they became gradually drunkards and ended in misery.

The field laborers, men as well as women, employed upon the farms, come in the spring from the mountains, very sterile parts, where, during the winter, the men are employed as wood-cutters, and the women spin, and live mostly upon what they have earned during the summer as farm laborers. They receive there regular meals, dinner and supper, and generally two pounds of rye-bread, and a half bottle of common brandy.

It has been in vain tried to give them, instead of the brandy, the money therefor; but they prefer (men and women) to take their ration of brandy, which after awhile proves not to be sufficient for them, and they spend for more their hard-earned money. Most of the drunkards now seen consist of this class of people, whose winter habits in the mountains follow them to the fields and to the city.

The middle classes of the people of this part of Germany drank heretofore, as a beverage, cider, principally in the evening, often to excess. As cider, drank in large quantities, produces generally sourness of the stomach, they added, in the belief of remedying this, a glass or more of brandy, and many became in that way drunkards.

The better class, and all able to pay therefor, drank generally light wines, and there were but few drunkards among them.

Such was the state twenty years ago. By the improvements in making better beer, things have been changed. The drunkards have disappeared. A great deal less of cider and wine is consumed. The people now generally drink beer. Many drink to excess even now. Intoxication has decreased.

Now, owing to the fact that in the German army coffee in the morning has been introduced, the young men get accustomed thereto. At noon they now cook themselves coffee instead of drinking, as heretofore, brandy with their bread. They drink now also in the afternoon coffee or beer. So that now they consume little or no brandy. The field laborers, men as well as women, continue, however, to drink brandy, notwithstanding that in the morning on many farms they now receive coffee.

The laws of Prussia do not allow intoxication as a plea in the defence for crimes. It is left to the judges to take accidental intoxication into consideration. No statistics are therefore kept as to the causes of crime. Intoxication continually occurs, not habitual, and not causing crime; but it is more accidental, from over hilarity in drinking.

It cannot be said that the general health of the people has suffered or suffers in this part of Germany. In the city of Frankfort, with a population of one hundred thousand persons and an average annual mortality of fifteen hundred persons, hardly an average of five persons have died of delirium tremens.

As a general fact in Germany, in those parts where wine grows and where the chief beverage is beer, there, intoxication is less and has been decreasing.

The contrary is the case where there are large distilleries, and more ardent spirits are consumed.

It cannot be said that the prosperity of the people has suffered. If it has not increased in equal rate with other countries, it is more in consequence of the increased extravagance in the luxury of dress among the females, and the passion of hunting after pleasure. During the winter, not only all the beer-houses, but all other places of amusement are now filled. In summer, public gardens and excursion-trips and the amusements of the Sunday generally use up the earnings of the week. Very few of the common people lay up money.

FLORENCE, May 20, 1870.

SIR :—I have received your circular of February 23, 1870, asking information in regard to the use and effects of intoxicating drinks in Italy, and I proceed to reply.

The intoxicating drinks consumed in Italy are,—*First*. The native wines of the country, which are abundant and very various in quality. In general the Italian wines are not so light as those of western France, nor are they, though often excellent, so carefully or so skilfully prepared. As in other wine-producing countries, the wines designed for sale are largely adulterated, and the better qualities extensively counterfeited, so that pure wine is scarcely to be had except directly from the producers. As a general rule, Italian hotel keepers in the large towns furnish only such native wines as it is impossible to drink, in order to compel their customers to order foreign wines on which they make a larger profit, and of course travellers, who judge Italian wines by those they take at hotel tables, can form no just opinion of their quality.

Secondly. Foreign wines, imported chiefly from France, and in smaller proportion from the valley of the Rhine, from Austria, including Hungary, from Spain, Portugal and Greece. The foreign wines are used principally by foreigners travelling or residing in Italy, but wealthy Italians consume a good deal of French wine, and the products of the Austrian and Hungarian vineyards, introduced into Venetia and Lombardy during the Austrian rule, have acquired a certain favor in those provinces, and are still imported and used by the inhabitants to a considerable extent. The native Lombard and Venetian wines are generally of inferior quality, and this circumstance also encourages the importation of those of northern growth in preference to the less carefully prepared wines of Southern Italy, to which the taste of the people of the newly acquired territory is not yet accustomed.

Thirdly. Spirituous liquors, generally of inferior quality, distilled in the country, and a certain amount of French brandy, Holland gin, and American and Scotch whiskey and rum, a considerable part of all which is used as the basis of different liquors and cordials. The employment of distilled spirits as a beverage, except as an ingredient in cordials which are taken in very small quantities, and as a zest for coffee, is recent in Italy, and is due principally to the diminished quantity and increased price of wine, in consequence of the prevalence of the grape disease.

Fourthly. The same cause has greatly increased the consumption of beer which is both manufactured in Italy, and imported from the German States. The malt liquors preferred by the Italians are mild, and as their table does not tempt them to excess in these beverages, it is perhaps hardly just to class such liquors among the intoxicating drinks consumed in Italy.

I am not aware of the existence of any trustworthy statistical information in regard to the amount of crime produced by intoxicating drinks in this country, but, if one can trust the police reports, the excitement of intoxication is the source of a by no means inconsiderable proportion of the offences which are brought to the notice of the public authorities.

So far as my observation extends, I should judge that the breaches of the peace and other violences traceable directly to intoxication, are much more frequently due to the use of ordinary distilled liquors and of absinthe and other like detestable mixtures, than to that of wine.

Wine is used in Italy as a beverage for quenching thirst, or as an accompaniment of solid food, and but rarely for the sake of its action as an excitant. It is the habitual every-day drink of the

people, from a very early age, and it does not, when taken in the moderate quantity which satisfies a common Italian appetite, seem to produce the same stimulating effect upon their constitutions as upon those of nations less accustomed to it.

The educated and refined classes make very little use of distilled liquors, domestic or foreign, and they seldom indulge freely even in wine, though it is always within the reach of every one, except the poorest. Intoxication is therefore extremely rare among persons of even no more than average culture, and it scarcely occurs except among the badly fed, badly clothed and badly sheltered, who have too often become previously debased by indulgence in other vices. In short, intemperance is not so prevalent in Italy as to rank among the great social evils which force themselves upon the attention of the criminal legislator, the public economist and the philanthropist alike, and the subject has but little of that terrible importance which attaches to it in the United States and the British Empire.

I have no doubt that this remark is equally applicable to most—I am sorry I cannot say all—wine-producing countries, and I am inclined to the opinion that an abundant supply of cheap, light wines would tend, in the long run, to diminish rather than increase intemperance in the United States.

But this is a question upon which I cannot venture to pronounce confidently, without fuller information than I possess and more mature consideration than I have been able to bestow upon it. The climatic and other physical conditions of the United States, not to speak of long established habits among the people, are so different from those of European vine-growing countries, that we must use much circumspection in reasoning from one to the other. Aside from the mere gratification of the palate, the habit of smoking—for the Italian is guiltless of the filthiness of chewing—tobacco, is almost the only provocative of intemperance which is common to the people of the United States and those of Italy. Each country has its special temptations and incentives to this vice, but in Italy they are more easily resisted, the habit of indulgence in stimulants is more readily conquered, and there is no possibility of doubt that intemperance is both a vastly more common and a more destructive vice in the United States than in the European countries situated between the same parallels.

From the effect of a cold winter climate and a more abundant supply, the American consumes habitually a very much larger proportion of animal food than the inhabitant of Southern Europe, and this he seasons with a much greater quantity of salt and other thirst-excit-

ing condiments; the frosty air, which he inhales with every breath for a large part of the year, smites his vitals with a chill which seems to demand a fiery fluid for its expulsion, and when the short season of agricultural toil returns, he uses more muscular effort, and that too during the hottest months of the year and the hottest hours of the day. These circumstances create in the American a chronic appetite for drink which is not easily assuaged by "thin potations," and he craves, if he does not actually need, beverages rather strongly *accentuated* in their appeals to the palate.

It is certainly not probable that persons long habituated to the use of distilled liquors would readily abandon them for the milder wines, or indeed for any fermented drink however generous, and cases would no doubt occur, where persons previously altogether abstemious would be seduced into excess by the temptation of a cheap and agreeable drink, the intoxicating properties of which might be as questionable, or at least as stoutly disputed as those of lager beer, but it is to be hoped that the use of light wines, especially at meals, would prevent the formation of habits of indulgence in stronger beverages by thousands who are now ruined in mind, body and estate by intemperance.

I am, sir, respectfully yours,

GEORGE P. MARSH.

FAYAL, AZORES, 15th May, 1870.

SIR :—Your favor of 23d February, via Lisbon, only reached me on the 28th ult. I regret that I cannot give you any information worthy of your notice, in regard to the very important and interesting subject on which you wrote.

Until the almost entire destruction of the vines in 1855, comparatively little spirit was consumed in these islands, the common wine of the country, which was freely used, costing only from eight (8) to ten (10) cents per gallon. At present, wine is quite expensive and rum has taken its place, but I cannot say that there has been any marked increase of intoxication. These people, like all the Latin races, I believe, are far more temperate than the Anglo-Saxons, and there is *very much* less intoxication here than in the United States. No statistics are to be had of the amount of intoxication and crime resulting therefrom, but the islanders (of the westernmost islands especially) are a quiet, inoffensive people and crime is very rare. I sincerely wish that I could have been the means of throwing more light on the important inquiries you are making, and remain,

Yours respectfully,

JOHN P. DABNEY.

GENEVA, May 2, 1870.

DEAR SIR:—In reply to your questions, 1st, what are the chief intoxicating drinks used in Geneva and vicinity? and, 2d, what amount of crime is produced by them and their effects on health and prosperity of the people?

I answer to the 1st, the most deleterious intoxicating drink used here is *absinthe*, which is a strong and generally mean *eau-de-vie* flavored with wormwood (not brandy, for this is called *cognac* or *champagne fin*), made of the must of poor grapes, or perhaps of potatoes, and paralleled in our country by that pine-top whiskey or apple brandy, which “are warranted to kill at forty rods;” next to this is a mean white wine, which taken in excess, destroys the digestive organs. If, which is rare, one of the better class of men is given over to the disease of intemperance his career is generally ended with *absinthe*. For the poor, the destroyer of health and promoter of quarrels is the aforesaid white wine.

An experience of several years has satisfied me that there is far less intoxication, and crime as its resultant, among the Swiss than with us. A stranger would be deceived as to this by noting the multitude of *cafés*, which answer to our saloons or restaurants, and the crowds which frequent them; but an attentive observer will note that rarely is any one seen to leave the better class of *cafés* the worse for what he has drank—which is coffee or beer or wine or a small cordial glass of brandy with a lump of sugar—but he will also be surprised to find so much quiet in a large crowd when there are persons engaged with newspapers or playing chess or cards or billiards, or in earnest conversation around tables where half a dozen may gather, and all furnished with the means of exhilaration. The truth is wine, *vin ordinaire*, or the wine of the country (known among us as claret) is the daily drink of every family whose circumstances will permit it, and this includes all but the very poor. This wine is less exhilarating than our cider and more healthy, and to this, and the quiet lives of the people, may be attributed the absence of drunkenness, for it is not common to see a staggering drunkard in the streets here.

I have never seen any statistics of crime in Switzerland.

The prosperity of this people would be increased by a diminution of the number of *cafés* where they waste their time rather than their health.

Very respectfully, your obedient servant,

CHAS. H. UPTON, *U. S. Consul.*

LEIPSIK, May 4, 1870.

DEAR SIR:—Your favor of February 23, making inquiries concerning the chief intoxicating articles used in Leipsic, and the amount of crimes produced by them, has been received. In reply I have the honor to give you a few, only approximately correct, statistics relative to these inquiries.

The chief intoxicating articles used in Leipsic, are *beer* and *wine*. Comparatively little whiskey or rum is consumed as beverages. Among a population of about 95,000 inhabitants (independent of the large floating population during the three annual fairs), there are annually consumed in Leipsic about 400,000 gallons of beer and 150,000 gallons of wine.

The number of arrests made by the police during the month of April was 506, of which number were 42 for drunkenness. This, according to my recollection, is a fair average of the arrests made during every month of the year, so that among the annual arrests of 6,072 persons, 504, or nearly eight per cent. of those arrested, are arrested for drunkenness, or a little more than one-half per cent. of the entire population. That drunkenness occurs unknown to the police I freely admit, but, I believe, so far as my observation goes, not half as much as in American cities of a like number of inhabitants.

As to what amount of crime is produced by the use of beer and wine I have no data according to which I might make my calculations. But so far as the publicity of these crimes is concerned the percentage, according to my observation, is comparatively small.

As to the influence of these drinks upon the health and prosperity of the people I have no means of judging except my own observation. I cannot say that either my own observation or the opinion of physicians teaches me that a moderate use of these drinks acts in a deteriorating manner upon the health of the public; for, according to the testimony of physicians, the general health of the public is good. Of course there are always exceptions, and perhaps many.

As to the influence of these drinks upon the prosperity of the public I have no data except my own observation. Considering, *first*, the comparatively low wages of the laboring classes; and, *second*, the universal practice of smoking cigars, independent of, and during, the drinking of these beverages, I cannot but believe that both these practices consume a comparatively large amount of the weekly wages of the laboring classes, thus reducing their home comforts to the lowest possible degree, and producing in many cases an actual want of the necessaries of life.

I have given you, without fear or favor my opinion, based upon

my observation, concerning the amount and influence of intoxicating drinks consumed in Leipsic. Of course in some particulars I may be, for ought I know, wrong.

Very respectfully yours,

M. J. CRAMER, *U. S. Consul.*

UNITED STATES CONSULATE, TOWER BUILDING, SOUTH WATER ST., }
LIVERPOOL, June 13, 1870. }

GENTLEMEN:—Your letter making inquiry about the influence of intoxicating drinks upon the people of Liverpool and England was duly received. Not having the requisite information myself to make a correct and proper report upon the subject, or the time to spare from my official duties to obtain the facts, I referred your letter to an esteemed friend, not only competent but reliable, to obtain them for me. I now have much pleasure in enclosing to you Mr. Patterson's report. His knowledge of the subject and his character and standing as a man are a sufficient guarantee for what he says, and if more were necessary I might add that my residence for more than eight years in the country confirms me in the belief that he has not in the least overstated or exaggerated the truth.

I am, sir, very respectfully, your obedient servant,

THOMAS H. DUDLEY.

LIVERPOOL, May 27, 1870.

THOMAS H. DUDLEY, Esq., *U. S. Consulate, Liverpool.*

MY DEAR SIR:—In acknowledging receipt of your note and replying to your inquiry as to the influence of intoxicating drinks upon the well-being of our population, I have judged it advisable to accompany my remarks by two documents, bearing upon the question in its moral and physical aspects.

The first is the report and abstract of evidence upon intemperance of a committee of convocation of the province of Canterbury, being the highest ecclesiastical authority of the Established Church, and they, after an exhaustive examination, concur with the opinions heretofore expressed by Presbyterians, Methodists, Baptists and others as regards the evils inflicted upon the people by the excessive use or abuse of intoxicating drinks, whilst they attribute the prevalence of this vicious abuse largely to the facilities for obtaining the same, and that, in the cases where landed proprietors have prevented the opening of drinking-houses upon their property, great blessings have resulted in the peace and sobriety of such parishes.

The second document is one of a more local character. The coin-

cidence of an excessive death-rate in Liverpool with an increase of public-houses led to much discussion, and the policy of the magistrates in opening the trade to all comers with suitable houses against whom no bad characters could be proven was impeached, not because it shut the door against favoritism, which was a good thing but because its (impartial) operation added to the numbers of a trade already excessive in the town. This led the town council to an examination, and I may remark that so far as I know no teetotaler had a place, as none has at present, upon the magisterial bench or the town council, whilst upon the latter body the liquor traffic has a powerful representation, and a brewer and owner of a large number of public-houses was a member of the sub-committee of the health committee of the town council, appointed to inquire into the mortality of the town. Their report, page ix, assigns to intemperance the foremost place as a cause of increased death-rate, and in my humble opinion rightly.

There is a topic upon which I am, perhaps, not competent to enlarge, nor can I readily refer to printed evidence beyond margin, but which I would venture to indicate as deserving of attention, namely, the increase of drunkenness amongst women. Our respected stipendiary (police) magistrate has, in my hearing, remarked upon it as one of the saddest features of our black record in Liverpool. It can hardly be doubted that the increase of beer-houses has, by carrying drink to nearly every corner, largely contributed thereto.

Another point deserving more investigation than I can give to it is how far incautious alcoholic medication may contribute to the increase and perpetuation of drunkenness. It is only by the medical profession such can be explored and remedied, but there is a growing feeling amongst social reformers (in which I share) that not only are nurses and other officials in our hospitals, &c., exposed to demoralization from the quantities of alcoholic drinks passing through their hands or under their care for supposed medical uses, but that in many cases a taste for the article may be formed or (more frequently) revived by the administration of liquor in a palatable form, and, however valuable as a medicine, it appears needful that more care should be taken in its exhibition. The remedies suggested for the cure of existing evils are mainly upon the one hand moral suasion and temperance pledges, which are much relied upon by some teetotalers, whilst others go for legislative restrictions upon the traffic. Upon this persuasive or pledge aspect of the case it may be remarked that whilst most indisputably great good has been done by teetotalers both in the prevention and cure of drunk-

eness, and especially by preventing the use of drink amongst the young, thus guarding against the habit, multitudes who have signed pledges do not now abstain, and it is doubtful if much over ten per cent. of our adult population are abstainers from choice continuously. Whilst trade and social usages still make drinking alcoholic liquors an institution, no party or organization has yet adopted (here) the Maine liquor platform, but the United Kingdom Alliance proposes to give to parishes and municipalities (by imperial legislation) powers to prohibit the common sale of intoxicating drinks upon the vote of two-thirds of the rate-payers to that effect.

Another organization exists for the suppression of Sunday trading and another for restriction and regulation of hours, &c., of public houses, whilst another section of reformers (who are not yet an organization) suggest that legislation either imperial or permissible to localities should close drinking houses, but not prevent the importation, manufacture, or sale of drink "not to be consumed upon the premises," leaving all persons at liberty to buy and consume at their own houses. This latter would probably involve the recognition of hotels as the temporary homes of *bona fide* travellers and permit sale of drink in them to their lodgers. To this latter section of opinion Dr. Temple, Bishop of Exeter, has given the weight of his experienced judgment.

The non-abstaining reformers indicate mainly two agencies, one, the competition of scientific pursuits and amusements upon the Lord's Day with the open public-house, but it is justly responded that the people who drink evidence no such predilection for museums, scientific lectures, &c., as to make the experiment hopeful, whilst its friends do not evince much confidence in its success or they would provide such gratis, as is done by professors of Christianity who hire lecture halls, theatres, &c., for the preaching of the Gospel without money and without price.

The scientific demand, not a very loud one however, being that public servants in museums, libraries, &c., who are paid for six days' work should labor seven. The only legal obstacle, so far as known to me, being that as no charge can be made for admission on the Lord's Day to lectures or concerts they cannot be made self-supporting. That amusements would check drunkenness is a theory somewhat insisted upon, but as to which few, if any, proofs are alleged.

The sheet-anchor, however, of social reformers who are opposed to repressive legislation is education; educate the people, say they, and they will not drink. But at the threshold practical men meet this by denying that it can be done. Twenty thousand street Arabs

need education in Liverpool, but they need food first; as they are the children of drinking parents they must beg or steal, sell matches or in some inscrutable way get bread; shut them up in schools and educate them; £40,000 per annum will do this; but to feed them, and feed you must, if the parents go on drinking, £200,000 more is needful. Besides it by no means follows that in the next ten years your 20,000 will fall to 10,000 needing sustentation. It is more probable it will increase to 40,000, as, if the drunkards' children are fed and educated at the public cost, an increase may be expected to follow from natural law.

I have endeavored to place before you facts and theories, well knowing that the intelligent persons for whom you seek the information are well able to sift, and I hope in due time to be favored with a sight of the results of their inquiries.

Some extended knowledge of the people of this United Kingdom and short visits to our great colonies upon the St. Lawrence, Hudson, Delaware, Chesapeake, Ohio and Mississippi, as well as "the Hub" itself, have impressed me with the idea that our Great Family have a mighty part to play in the world's history, but that if the Anglo-Saxon race is to lose its primacy amongst the nations it will be from the miry clay of drunkenness destroying the cohesion of its iron nature, and whenever the stone may strike the right foot in England or the left in America it will be the just judgment of the mighty Ruler amongst the nations, who is even now warning us unmistakably to set our houses in order if we would retain the high place he has given our ocean-parted yet heart-joined nation in the midst of the earth, for England and America are one in origin and destiny.

I remain, my dear sir, yours faithfully,

JOHN PATTERSON.

P. S.—Adulteration is alleged upon most respectable authority to be chargeable with much of the deadly effects of drink, but I am not aware of any facts disclosed upon coroners' inquests or elsewhere which indicate that one person out of each hundred "slain by drink" was poisoned by any substance other than alcohol. J. P.

LONDON, 21st April, 1870.

DEAR SIR:—Your letter of 23d February last, requesting on behalf of the State Board of Health of Massachusetts information in regard to the influence of intoxicating drinks on national health and prosperity, was received a few days ago.

You propound two questions: 1st, "What are the chief intoxicating articles used in England?" In reply, I have to say that

the Board of Trade returns show that for the year 1869 there were bought in Great Britain for home consumption,—

Of foreign wine,	15,151,741 gallons.
Of home and foreign spirits,	29,407,499 “
Of ale and beer,	896,533,056 “

You ask, secondly, as to the amount of crime produced by them, and their effects on the health and prosperity of the people, with which question is coupled another as to the relative amount of intoxication in Great Britain and the United States.

You will pardon me if I do not attempt to give any answer to these inquiries.

The subject is too vast and too grave for me to treat of it superficially, and I have not the time, consistently with my attention to absorbing official business, to make investigations which would be of value to you.

I enclose two pamphlets, which seem to me to contain considerable and interesting information on the subject of temperance, although they have an unpretending appearance.

It will give me pleasure also to send you such other statistics or official information as I can find.

I am, very respectfully, yours,

JOHN LOTHROP MOTLEY.

UNITED STATES CONSULATE, MALTA, 13th May, 1870.

DEAR SIR:—In reply to your circular letter, dated 23d February, 1870, I have to say:—

1st. The chief “intoxicating articles” used in Malta are, for the native population, a common white wine imported from Marsala, Sicily, and a common red wine from Riposto di Mascali, Sicily, sold at three to three and a half pence per quart bottle.

The lower orders use also a common brandy from Sicily, frequently mixed with anise-seed.

The better classes use the principal wines of Europe, chiefly the red and white French wines, Madeira, Marsala, port and sherry, besides a sort of stomachic, which I hear is coming into favor, compounded of spirits, Peruvian bark and cloves or cinnamon. No wine is made in the island, and, I believe, no spirits.

As for the foreign population, which is almost exclusively English, their habits here are precisely what they are in all other parts of the world. They eschew the lighter wines, and drink beer of all

brands (English), heavy wines (sherry, port, Madeira and Marsala) and spirits.

2d. In the absence of any government bureau of statistics, I cannot accurately give the amount of crime due to drunkenness or effects on health and prosperity of the people. Among the soldiers and sailors—from five to six thousand—there is the usual amount of drunkenness to be found in a great garrison town. One of the chief surgeons of the fleet tells me there is more *pulmonary disease* among seamen here than at any other station in the British service, but he does not account for it.

The native population is certainly very temperate. The amount of drunkenness to be seen here is as nothing compared with what is seen in the United States. Yet I am told there is a manifest deterioration within the memory of observers—more intemperance and more disease or debility than a generation ago. I think it is due to the presence and example of the garrison.

Respectfully, your obedient servant,

LYELL T. ADAMS, *U. S. Consul.*

MANCHESTER, May 19, 1870.

DEAR SIR:—I have this day forwarded to you through the State Department an answer to your letter of 23d of February last making inquiries in regard to alcoholic drinks in this country.

I also send a report of the Committee of Convocation.

If your letter was mailed on the day of date, it must have been detained a long time on the way.

I am, respectfully, yours,

C. H. BRANSCOMBE, *U. S. Consul.*

UNITED STATES CONSULATE, MANCHESTER, May 19, 1870.

SIR:—In reply to your letter of inquiry dated February 23d, 1870, I have the pleasure to give the information attached, the result of investigations pursued by me personally, and by English friends with whom I have put myself into communication upon the questions referred to.

1. The principal intoxicating liquors used in England are gin, brandy, beer, wine and cider. The wine is chiefly imported, though varieties of "British wines," made from currants, &c., mixed with distilled spirits, are manufactured and sold. Among spirits, gin is chiefly used by the poorer classes and brandy by the richer; beer (including ales of every kind) is most largely used by all classes; wine is used by the wealthier, though cheap and highly

adulterated sorts are also in extensive use among the middle classes; cider and perry are mostly confined to some of the agricultural counties of the west and south.

In Scotland and Ireland the principal alcoholic liquor used is whiskey, though wine and beer are also consumed to a considerable extent. Since the reduction of the duty on brandy, this liquor is competing more than formerly with home-made spirits.

Rum is chiefly used by the middle and lower orders of the three kingdoms. Professor Levi estimated that, taking the proof spirit in each kind of intoxicating drink consumed in each kingdom, the consumption of proof spirit in 1866 per head was as follows:—

PROOF SPIRITS USED.	ENGLAND. Imperial Gallon.	SCOTLAND. Imperial Gallon.	IRELAND. Imperial Gallon.
In Gin and Whiskey, . . .	0.536	1.659	0.800
In Brandy, Rum, &c., . . .	0.328	0.188	0.057
In Beer and Ale,	3.393	1.050	0.710
In Wine,	0.159	0.087	0.064
In Cider and Perry,	0.021	—	—
	4.437	2.984	1.631

(English proof spirit is about one-half alcohol and one-half water, or exactly by volume, alcohol .57, water .43; by weight, alcohol 49.24, water 50.76.) Thus the annual consumption of alcohol in England, chiefly in the form of beer, is two gallons and a gill, in Scotland one gallon and nearly a half, in Ireland rather more than four-fifths of a gallon. There is, however, no means of accurately estimating the quantity of beer and wine used in each kingdom distinctively, the estimate of the population of Ireland in 1866 being more uncertain than for that of either England or Scotland.

2. All the law, judicial, police and other authorities in this country concur that a very large proportion of the crime and poverty, sickness and premature death, is caused by the drinking habits of the people; and not merely by the grosser forms of intoxication which too visibly prevail. Of crime, it is considered that two-thirds, and of poverty three-fourths, arise directly or indirectly from the use of alcoholic liquors. Much valuable information on this subject is contained in the report of the Committee of Convocation appointed to inquire into the extent and action of intemperance, a copy of which accompanies the present letter.

Here, as in the United States, the drinking customs render much

crime possible which else would be impossible; they also prompt and excite to criminal offences of all kinds; they bring great numbers into a condition where they readily become subject to criminal attacks; and they plunge vast masses into a low and degraded social state, from which the transition into crime becomes easy, rapid, and humanly speaking, in the case of multitudes well nigh inevitable. The statistics of drunkenness give no proper conception of the extent of that vice; for, unless incapable or violent, intoxicated persons are seldom arrested, and the process of manufacturing sober men and women into drunkards goes on with steady regularity in the drinking shops of all classes without any practical hindrance from the administration of the law. So long as very flagrant and repeated disorder is avoided, the publican or beer-seller is sure to remain in undisturbed possession of the license when once granted; and even where police charges are made and convictions ensue, a reprimand or warning is usually all that is administered at the annual licensing day.

Upon health, life and commercial prosperity, the drinking customs act very injuriously, and not least when the signs of external excess are absent. The great quantities of beer drunk in England slowly but certainly sap constitutional vigor, and, according to high medical testimony, there is no form of disease which does not find food and fuel in the vital degeneration brought about, even where there is a complaisant confidence in the innocuousness of so-called "moderation."

The inquests in England and Wales (inquests are not held in Scotland and Ireland) in the year ending September 29th, 1868, were 24,774, and every coroner confesses that, besides the number of cases in which excessive drinking is distinctly named as the direct cause of death, a very large proportion of the other cases springs, either from the physical effect of intemperate or tippling habits from the congenital disease, or from the destitution or recklessness connected with the drinking habits of fathers and mothers.

The commercial interests of the country suffer sadly by the poverty and pauperism, created by the idle and irregular habits thus induced, by the loss of skill and vigor attending alcoholic indulgence, and by the enormous expenditure of money on the purchase of intoxicating liquors, amounting to a hundred million sterling, besides the waste of grain, capital and labor, in the production of such drinks, and above all, of the labor force wasted in the excitement of drinking.

3. Comparing certain towns in the two countries most nearly alike, as Liverpool and New York, Bradford and Cleveland, Bristol

and Boston, and certain corresponding classes, such as the commercial, the fast and the fashionable, one does not see much difference as to the prevalence and results of drinking. The disorder, degradation, pauperism, prostitution, lunacy and crime are in both appalling. But on the other hand, looking at the moral and religious classes in the smaller towns and villages of the two countries, comparing the social and domestic usages of the respectable classes of our New England States, or of Pennsylvania and of Ohio, with the corresponding classes and communities of England, there can be no doubt that the balance of sobriety is very greatly in favor of the former, and more particularly of Connecticut, Rhode Island, New Hampshire, Vermont, Massachusetts and Maine.

In this country there are hundreds of villages, some large districts and several little towns, from which the liquor traffic has been banished by magisterial and proprietorial power with the most gratifying results. Crime has ceased, pauperism has almost vanished, lunacy has disappeared, and industrial and moral progress has been made. These facts seem to have taken hold of the hearts and thoughts of the people, and some years ago an agitation (under the direction of the United Kingdom Alliance for the Suppression of the Liquor Traffic) was commenced, which has risen into great political influence. Its parliamentary leader, Sir Wilfred Lawson, Baronet, M. P. for Carlisle, supported by Sir Thomas Bazley, Baronet, M. P. for Manchester, is about to introduce for the third time, his Permissive Bill into the House of Commons, which proposes to give to all the rate-payers and owners of property the power to veto the common sale of intoxicating liquors within their parish or district. The second reading of this bill is fixed for the 13th July next. Eight hundred thousand persons petitioned for the passing of the bill last year, and 94 members voted for it, representing a constituency of 7,000,000.

I remain, yours, very respectfully,

C. H. BRANSCOMBE,

United States Consul, Manchester.

UNITED STATES CONSULATE, ODESSA, RUSSIA, }
May 4, 1870. }

DEAR SIR:—In reply to the questions placed in your favor of February 23d,—

The chief intoxicating article used here is “vodka,” or in plain English, *whiskey*. It is made and sold under the direction of the government. It is prepared in different forms,—that is, clear and

pure; clear and sweetened; colored (in tempting colors), such as green, red, yellow, rose; and also flavored with different spices and herbs. It is sold, I am told, in something like two thousand "licensed horrors" in this city, and at every little village and station all through the country, at the very moderate price of about three to five cents a gill. This is the strong drink of the common people (as they are called), emancipated serfs, laborers, soldiers and their females, who frequently outdo their husbands and brothers.

Wine is made (red and white) in large quantities in the Crimea, in Bessarabia, and in the different German villages (of which there are many in the south of Russia), and to some extent in the Russian villages. Quantities of it are brought into this place in large casks (of two hundred gallons) in the autumn, and sold (the pure unfermented juice) for, say, twenty to fifty cents a gallon, and afterwards retailed out at higher prices, say, twenty to fifty cents a bottle. Excellent brandy is distilled in some places from the wine of this country. Beer and ale are also made here. Besides this, all kinds of liquors, wines, cordials, beer, porter, are imported from other countries and sold without restriction except the duties and tax for license. These articles are mostly used by the different strata of society above the "common people" or peasantry.

It is the custom, very general with these classes, to have wine at least for dinner (frequently for breakfast also, at ten, eleven or twelve o'clock), and very often they begin with a small glass of raw brandy or other spirit.

There are wine tipplers and jolly parties who drink wine and beer (perhaps even spirits) at all hours of the day and night, but such persons are, for the most part, idlers and shiftless persons or young rowdies, the custom being to drink little at other times than breakfast and dinner. It is rarely seen, a drunken person of the classes last mentioned.

You may meet them, often enough a little hazy after dinner, and often enough their appearance indicates free living, but seldom are they to be seen past perfect self-control.

Those who drink "vodka," on the contrary, are often to be seen staggering about (men and women), or lying in some corner insensible. This is much more often the case on Sundays and holidays, of which latter the number is very great in Russia.

There are no statistics as to the amount of crime chargeable to intoxicating or exciting drinks, but from my own observation, I should say at least three-fourths of all. They are, without doubt, a great plague and drawback to material and moral progress in this country. The effects of all such exciting drinks are, in my opinion,

prejudicial to the health, happiness and prosperity of those who habitually use them, and, generally in proportion to the freedom with which they are used.

The moderate and immoderate drinkers, if they be habitual, are all sufferers, and visibly sufferers in these three respects. My own belief is, whiskey, rum, gin, brandy, wine, beer, ale, porter,—all bad, and the stronger the worse.

I might add coffee, tea, tobacco and all unnatural excitants of the nervous, muscular and circulatory systems.

Very respectfully, yours,

TIMOTHY C. SMITH.

TENERIFFE, July 15th, 1870.

DEAR SIR:—A very long time has elapsed since the receipt of your favor of February 23d, making some inquiries respecting the use and abuse of intoxicating drinks in this island, the reason for which has been, that there being no statistics on the subject, I asked one of the principal physicians to give me his and some of his colleagues' opinions on the subject, which he promised to do; but Spanish like, this was put off from day to day, until at last he suddenly embarked for Spain, but promising to be back in a month, I still waited for him. On his return he again renewed his promise, but nearly a month having elapsed without his reply being received, I have resolved not to wait any longer, but to address you now in answer myself, and whenever his opinion is received, I shall send it to you.

Your first question is, what is the chief intoxicating drink used in these islands? Up to 1845 this was eminently a wine-producing country, this island alone having produced as much as 25,000 pipes. The oidium having destroyed the vines about that time, the drinks substituted have been the rum of West Indies, and gin of England and Holland. You are of course aware that in wine-producing countries intoxication is rare, and this was the case here while only wine was drank; since then the vice has increased, but not to any considerable degree, although I should say that the use of alcoholic drinks has told upon the health and shortened the lives of many, and perhaps caused some crimes.

I should say that there was far less intoxication here, among a given number, than in the United States, owing to the Spaniards being an abstemious people generally, and I don't know where you can find a soberer class of people than the peasants of these islands.

I remain, your most obedient,

WM. H. DABNEY.

UNITED STATES LEGATION, VIENNA, }
June 17th, 1870. }

SIR:—In reply to your circular note, dated February 23d (but which did not reach me until a much later date), asking for advice touching the intoxicating drinks used in Austria, and their effect upon the health, prosperity and morals of the people, I beg to say that I have delayed my response, in the hope of procuring some reliable information, which I have not yet received.

Upon the receipt of your letter, I requested Mr. Delaplaine, the Secretary of Legation at this post, who has lived in Vienna some sixteen years, and has a large circle of acquaintance, to apply to such gentlemen as he thought might be able and willing to answer your questions.

Most of those to whom he applied seemed unable or unwilling to give their assistance, but Dr. Adolph Ficker, one of the Court Counsellors, and a Director of the Administrative Statistical Bureau, obligingly promised to examine the matter carefully, and report in writing, with statistics of the amount of alcoholic and other liquors consumed in the empire. As the promise was given several weeks since, Dr. Ficker's report has been for some time expected at the Legation, but it has not yet been received. I have also made a request at the Foreign Office for such information as may be gathered in the Bureau of Statistics, and I am in hopes of being soon able to send you, in part at least, satisfactory answers to your questions.

In view of the short time that I have been in Vienna, and of my very limited opportunities of observation in the provinces, I am sensible that my opinion (for which you are pleased to ask) upon a question so properly soluble by statistics, and by a comparison of the opinions of many experts, can be of little practical value.

I am advised by those in whose judgment I have confidence, that the chief intoxicating drinks in Austria are beer and wine, and that but comparatively a small amount of spirituous liquors is consumed, excepting in Galicia; that the relative consumption of wine by the people is diminishing, and that that of beer is increasing; that the beer in general use is of a light kind, requiring the consumption of a large amount either to stupefy or to intoxicate; and that the influence of intoxicating drinks in Austria in producing crime is less marked than in our own country, and in England.

Touching "the relative amount of intoxication in the country where I am residing and that seen in the United States," I may say that I have seen more intoxicated persons in the streets of New York in one day than I have chanced to see in Vienna during the past year.

I am sir, very respectfully yours,

JOHN JAY.

[TRANSLATION.]

REPORT FROM STATISTICAL CENTRAL BUREAU OF AUSTRIA, TRANSMITTED THROUGH THE I. R. MINISTER OF FOREIGN OFFICE TO MR. JAY.

Consumption of spirituous liquors in Austria-Hungary.

The use of spirituous beverages in the Austro-Hungarian monarchy can only with approximate exactness be determined from the annual production, and with proper consideration of the transfer in way of trade. We here present estimates of the following quantities for the whole monarchy during the last five years:—

Production and Consumption in Austria-Hungary, from 1864 to 1868.

	Quantity.	1864.	1865.	1866.	1867.	1868.
Production,	.	Eimer,*	13,943,217	13,597,450	12,887,591	13,833,844
Import,	.	Eimer,	7,507	4,695	4,395	5,669
Amount,	.	.	13,950,724	13,602,145	12,891,986	13,839,513
Deduct export,	.	Eimer,	136,569	130,115	216,433	289,875
Total consumption,	.	.	13,814,155	13,472,030	12,675,553	13,549,638

Production and Consumption of Wine in Austria-Hungary, from 1864 to 1868.

Production,	.	Eimer,	18,760,600	18,760,600	18,760,600	18,760,600
Import,	.	Eimer,	92,244	124,866	73,428	81,174
Amount,	.	.	18,852,844	18,885,466	18,834,028	18,841,774
Deduct export,	.	Eimer,	227,366	169,826	206,713	254,585
Consumption in the country,	.	.	18,625,478	18,715,640	18,627,315	18,587,189

* According to the "American Cyclopædia," the Eimer is equal to 12.457 gallons.

Production and Consumption of Brandy in Austria-Hungary, from 1864 to 1868.

	Quantity.	1864.	1865.	1866.	1867.	1868.
Production,	.	3,255,236	3,371,541	3,457,400	2,945,880	3,666,846
Import,	.	10,963	11,018	10,854	13,510	14,935
Total,	.	3,266,199	3,382,559	3,468,254	2,959,390	3,681,781
Deduct export,	.	70,647	91,529	100,159	152,183	304,310
Total consumption,	.	3,195,552	3,291,030	3,368,095	2,807,207	3,377,471
Consumption for objects of trade,	.	651,047	674,308	691,480	589,176	733,369
Balance consumed for drinks,	.	2,544,505	2,616,722	2,676,615	2,218,031	2,644,102

If there be adopted, pursuant to the official trade valuation during several years, an eimer beer at five florins, an eimer wine at eight florins, and an eimer brandy at twenty-three florins, the result is, by an estimate of thirty-five millions of population, an average annual expenditure for each individual of four florins twenty-six kreuzers for wine, one florin twenty-nine kreuzers for beer, and one florin sixty-seven kreuzers for brandy, whereby each would expend annually seven florins eighty-five kreuzers for spirituous beverages.

This consumption must be held as being extraordinarily greater if it be contrasted with the use of other products, in the quantity of which a graduated rule for the social development may be found.

So, for example, it is ascertained that out of the annual quantity of cast-iron and wrought-iron products and steel in Austria and Hungary, 3,560,000 centner in weight are required for the use of the agricultural economy. A centner of weight in such products, estimated at nine kreuzers, would allow for the expenditure for iron during the year the sum of ninety kreuzers for each individual of the entire population. Accordingly each inhabitant of Austria-Hungary would be expending for spirituous liquors eight times as much money as for iron, the most important agent of active industry.

Naturally what has been suggested here can only be regarded as an average estimate upon the whole consumption, inasmuch as the use of spirituous beverages varies exceedingly not only with individuals, but in the different provinces of the Monarchy. Especially can three groups of provinces be named as varying most: 1, the actual German provinces, with Bohemia, Moravia and Silesia, in which the consumption of beer plays the most important part; 2, the Hungarian provinces, where the use of wine is greatest; and 3, Galicia, with the North of Hungary, and Transylvania also, but in a less degree, the Alpine Highlands at the west, where most of the brandy is consumed; and although specific numerical statements cannot be adduced, yet the effects of this consumption upon the social development is an undeniable fact.

Already the wine-consuming Hungarian population, as regards the degree of industrial and professional ability, stands in the eyes of every impartial observer much below that which the inhabitants of the western provinces of the Monarchy have attained, while the Galician peasant, who ruinously exchanges for brandy his corn before it is ripe and yet in the pod, is lowest in the scale of industrial development.

He knows nothing of the valuable resources for improvement in

agriculture, secured through industry and science, and grows visibly poorer.

Indeed the degeneracy of the race in Galicia, although perhaps other agencies may contribute to it, is to be sought mainly in the excessive indulgence in corn-brandy; and thence it comes to pass, that out of the men called to military duty in Galicia, 37.9 per cent. are rejected as unserviceable on account of physical disability and infirmity, and 18 per cent. on account of under stature; accordingly in all 55.9 per cent. of those called are found unserviceable, whilst in the entire Monarchy only 9.2 per cent. appear as unserviceable for the army through under size, and 33.5 per cent. on account of physical disability and infirmity.

Temperance societies have as yet never been started in Austria, and the attempts at such, made particularly in Galicia, in imitation of those in some communities in Russia, have been without a successful result, mainly because of the "Propinations" privilege which exists and produces a large revenue to the landed proprietors, who therefore oppose to the utmost all such attempts, which may reduce their incomes.

I have been informed that the "Propinations" privilege consists in the right, claimed by land proprietors, and included in every lease from them to inn or tavern keepers, requiring the latter to purchase from the land proprietors all stores of spirituous liquors to be consumed in such inns or taverns, or, if that right be waived, then, that a large pecuniary consideration for the same be annually paid to the land owners.

ZURICH, May 10th, 1870.

DEAR SIR:—Your letter making certain inquiries about intoxicating drink, &c., &c., is at hand. In reply permit me to say that my residence here has been of but a few months' duration, hence my observations have not been very extended; but to the questions:

1st. Sour wines and lager-bier are used here in immense quantities. French and German wines are also used, but in much less quantities, by those able to import.

2d. I judge that the per cent. of disorder and crime arising from the use of intoxicating drinks is large. Yet I find no statistics on the subject. I am positive, however, that the effects on health and the prosperity of the people are very bad.

I am credibly informed that in certain cantons where wine in very great quantities is used, steady nerves are *rare*, while a great *tremulousness* of the hand is *common*. I am impelled to believe however, that intoxication prevails to a less extent in Zurich than

in American cities. Poor or sour wine and beer stupefy more than they intoxicate when used in ordinary quantities.

I am not in possession of any printed statistics on the subject, or I would forward with pleasure.

Very respectfully,

S. H. M. BYERS, *U. S. Consul.*

•
UNITED STATES CONSULATE, FUNCHAL, MADEIRA, }
MAY 8th, 1870. }

SIR:—I have the honor to acknowledge the receipt of your communication of February 23d, last past, requesting certain information in regard to the use of intoxicating drinks, and their effects upon the population of this island.

In regard to your first question, I have to say that the chief intoxicating drinks are wine and cane brandy; the former mild, but yet a heavy-bodied wine, and the latter inferior to the grape brandy of France, yet stronger than our American whiskey.

In answer to your second question, I have to say that the people here are a most exemplary people in the main, in regard to the use of intoxicating articles. Few are seen drunk, or even overly excited from the effects of drink. Indeed one seldom hears of a person being destroyed from its use. Considerable amounts of both brandy and wine are, it is true, consumed by the population, the better classes using wine daily at dinner, and the commoner people using both wine and brandy, without reference to time, but yet in great moderation. You can therefore well understand, that as a consequence, there are but few cases of crime resulting from their use. Indeed, I believe I have not heard of a single case since I am on the island, now going on five years. As to the impression upon the general prosperity of the masses, I think it is somewhat damaging, as the price of ordinary labor is very low, thirty cents per day being the price to a common laborer, which is in itself scarcely sufficient to maintain a family, even in the midst of almost the greatest poverty, since every cent taken from that amount for brandy or wine is most seriously felt by the poor families; and as nearly all drink a little, the amount of absolute poverty is very great.

As to the relative amount of intoxication in this island, as compared to the United States, I must say, that whilst no statistics are kept or collected by any one, yet I have no hesitation in giving it as my opinion, that the difference is greatly against our people in America.

I regret that I am unable to forward you any statistical information upon the subjects you have referred to.

With great respect, I have the honor to be, your very good friend,

CHAS. A. LEES, *U. S. Consul.*

UNITED STATES CONSULATE-GENERAL, BEIRUT, SYRIA, }
May 9, 1870. }

DEAR SIR:—Referring to your communication of the 23d February, I have the honor to observe that the influence of intoxication upon the people of Syria is almost imperceptible.

The native wine is not made in large quantities, yet sufficiently so as to give the middle class population at least, the use of that beverage, but its effect as such, is not to produce intoxication, which is almost unknown. There is, however, a colorless liquid called arak or rakia, which is distilled from the wine or made from the pumice. This is very intoxicating, but is used so temperately as to seldom produce bad results. Dr. Thomson, who has resided in Syria for about thirty-five years, says that he never saw a drunken man during the larger part of that time. During, and since the French occupation, which followed the massacres, foreign wines and some other liquors were introduced, and the former is now to be seen in many of the more wealthy families, yet almost never used to excess. There are two classes of the population upon whom the introduction of foreign brandy and whiskey is known to produce bad effects—the Turks or official class, and the lower foreigners, such as Greeks and Italians. Not until recently could a dram-shop be found, but now there are several, patronized almost exclusively by the low class of foreigners.

Your second question is in effect already answered. There being almost no intoxication, still less can crime be traced to that cause. In fact, very little crime is committed in Syria. Formerly, in the mountain districts of Lebanon, the existence of blood feuds led to many violent deaths, but the killing was done openly and in the name of justice. Three executions by Daoud Pasha, the first Christian governor-general after the massacres, have had the effect of almost suppressing this ancient custom. It happens now occasionally that different villages or factions will have a bloody affray, but the cause is generally some religious superstition. The larger part of the cases which come before the Turkish and consular courts relate to property and contracts, rather than crime. Assault, burglary and assassination are almost unknown, though a few horrible cases of the latter have occurred, yet have never been traced to the use of intoxicating liquor.

If the use of liquor in the general, but temperate manner habitual with this people has a gradual undermining effect upon health or constitution it is impossible to estimate it, nor have medical men given the question their attention.

I do not believe the people are less prosperous on account of its use, according to their customs, not because there would be no saving if they would abstain, but rather because their recreation and dissipation take such a mild, harmless form, that those who are most interested in their welfare would not interfere with their long established and harmless usage, believing that if they were led to abandon these habits—perhaps not entirely unobjectionable—they would in pursuit of recreation fall into the worse habits which a higher civilization generally brings with it.

Whoever has seen these people after the day's confinement in the close, dark, dirty bazaars, and the muezzin has sounded for evening prayers, assembled under large arbors in the public places, generally on an elevation where the cooler winds may reach them, seated on low stools smoking the nargelia, drinking coffee or arak from the smallest of cups, listening perhaps for the hundredth time to a story teller, who with wild gestures is reciting the tale of Ali Baba and his forty thieves; sitting thus for one or two hours after sunset, and then returning quietly to their homes until the streets become as noiseless and deserted as those of Palmyra, most of those who have thus observed their habits will not be inclined to condemn them very severely.

After the foregoing it will be unnecessary to express an opinion as to the relation of the amount of intoxication seen in this country to that of the United States. It would be impossible to give statistics, either as to intoxication or crime as no records are kept. My remarks are the result of observation only; but I am sustained by the opinion of some of the most reliable residents..

I am, sir, very respectfully, your obedient servant,

LORENZO M. JOHNSON,

Vice-Consul-General in charge of the office

NO. 80 CHATHAM STREET, COLOMBO, CEYLON, 13th August, 1870.

SIR:—On the 30th of May last, I had the honor to address you in relation to your letter received on the 17th of that month.

I have found it more difficult than I anticipated in obtaining the required information, either from a disinclination or want of time on the part of some of the government officials.

I am informed a census is being taken, and when the Legislative

Council convenes, which will be in the latter part of September, I may be able to send you more and later information.

Since my arrival in Ceylon, I have been located at the seaports of Galle and Colombo, in the most southern extremity of the island. It will therefore be out of my power, from my own experience, to give you any more information than is customary, wherein a foreign port, the jack-tars of all nations have a day's liberty on shore. From your queries, I am of opinion, you desire more particularly information in regard to the native inhabitants of Ceylon.

I therefore annex copies of letters on the subject, with which I have been kindly favored by parties who have been born on the island or have been long residents, which I trust you will find of interest. The first is from Dr. Julian L. Vanderstraaten, Assistant Colonial Surgeon for the Southern Province.

1st. All the European liquors are used by the better class. Chiefly drink arrack, which is prepared by the distillation of toddy, and is not unlike whiskey.

The juice of the flower and stems of the palm tribe yield the sweet liquor called toddy; it contains sugar, and when drank in the cut of the morning is an agreeable beverage which acts like a mild aperient; when the day gets warm it begins to ferment, and in this stage is prepared by the lower classes as an intoxicating liquor owing to its being very cheap. When this is fermented for days, it becomes converted into good vinegar, but the larger quantity is distilled for arrack.

2d. There is no doubt that the sale of arrack at a cheap rate (nine pence half-penny per bottle) has caused a great increase in crime of late. The natives, "Arrack Renters," as they are called, purchase the right of selling arrack from government at the annual sales, and then open taverns in the villages and towns. Under this system the illicit distillation is checked; by which a large revenue is obtained, and the use of arrack becomes much more common than before. The sober and steady class of natives, although exceedingly fond of litigation, seldom commit any serious crimes excepting once a year, viz., at their Singhalese New Year, 11th April, when they make merry, imbibing a good portion of arrack, under the influence of which they become quarrelsome and end by knocking each other over the head with clubs. It is only in cases of revenge and jealousy that crimes are committed without arrack being the inciting cause. When assassins are hired to commit a murder they can only be compelled to do it under the influence of arrack, money being no consideration with men of this class.

The use of arrack, particularly the fresh liquor sold in taverns,

speedily induces inflammation of the liver which ends in dropsy. Good old arrack seasoned in wine cases is a choice liquor. It is only served to troops after having been kept for years in store.

“Arrack drinkers are by no means industrious; they sleep away their time, while the female portion of the community have to work for their upkeep.”

Dr. Samuel F. Green, of the American Mission, located in the extreme north of the island, has favored me with the following answers to your queries, viz.:—

“1st. Palm toddy and arrack.

“2d. A great deal of crime, the effect on the health and prosperity of drunkards and their households markedly evil.

“3d. I should think it about equal.

“As the sale of arrack and toddy is favored, the comparative amounts paid annually, would elucidate the subject.

“I trust the investigation of the Board of Health may result in the formation of some effective plan, for the lessening of this great scourge of the human race.”

The Rev. J. C. Smith, also of the American Mission in the north of the island, writes,—

“My own impressions accord with Dr. Green’s,—this system of arrack rents is an unmitigated evil, and ruins many every year. We hope the agitation of the subject may result in checking the increase of the evil.”

James Loos, M. D., Member of the Royal College of Physicians, Edinburgh, colonial surgeon, born in Ceylon, has also favored me, viz.: “The chief intoxicating articles in use among the natives of Ceylon are *arrack* and *toddy*.”

“Toddy is the juice drawn from cocoanut palm in all parts of the island, except the north, where it is obtained from the palmyra (*Borassus flabelli formis*). The toddy is a favorite beverage. In its fresh state it is sweet and pleasant and can scarcely be said to be intoxicating, but it is not sold in the taverns for use until it has undergone fermentation to some extent, when it becomes sour and intoxicating. The spirit obtained from the distillation of toddy is arrack, which may be said to be the national drink of the Singhalese. The right to distil arrack is sold annually by government with whom it is a source of revenue. The arrack renter, as he is called, sells spirits by wholesale to tavern-keepers. Opium and Ganjah or hemp, are used by the Malays and Hindoos, and some of the natives of Ceylon have imbibed a taste for these drinks, but they cannot be said to be in common use. There is a large con-

sumption of brandy, beer, and the common beverages of the European. These are more plentiful and cheaper in the shops now than formerly, and the natives in towns prefer them to arrack and toddy, which they regard as common and vulgar drinks.

“There is no doubt that a large amount of crime in this country arises from the use of intoxicating drinks, and that their effects on the health and prosperity of the people are very marked. Cases of horrors (*delirium tremens*) are not found among natives, and it is believed that the use of arrack does not produce it; but I have frequently traced the occurrence of other diseases among the natives, to the abuse of alcohol. I am aware, that in the country, taverns have sprung up of late, which did not exist before, and that dissipation and crime have increased in the villages.

“I fear you are not likely to obtain official statistics of the amount of crime caused by intoxication anywhere. We are still greatly behindhand in such matters. We are only now beginning to take steps to obtain a correct census of the island, and to register properly births and deaths.

“When I had a medical connection with the principal jail in Colombo, it was not customary to inquire into the habits or previous history of prisoners; but it is possible that some advance has been made since that time in the collection of information on these and other points.”

I find in the “Colombo Observer” of 21st of July, an article, by its editor, headed,—“Crime in Ceylon and its Causes,” which has a bearing upon the subject under discussion, and I think will not be considered out of place:—

“Believing as we do in the dangers of moral contagion, we have endeavored to steer clear as much as possible of the law courts and their surroundings. A period of enforced attendance as juror, however, has certainly given us a view more vivid than ever of the prevalence of crime around us, even in the districts where Christianity, in some form or other, has been taught for lengthened periods. The comparative impunity too with which wrong-doers can long pursue a career of crime, without the arm of justice being able to reach them, has been forcibly impressed upon us by the details of a case from Minnangodde near Negombo, which occupied the whole of the 19th, and with reference to which the jury felt compelled by a sense of duty, to ask the presiding judge to make a representation to the executive government. Minnangodde is close to Negombo, which is the seat of a district judge, the village has the usual complement of peace officers, and a regular police station stands within a short distance of it. The Roman Catholic missionaries have been at work around Negombo for centuries, and for about half a century the Wesleyans have done their best for the people, and yet with reference to events which took place near Minnangodde in December, 1869, the serious attention

of the executive government has to be called to the fearful state of disorganization and crime into which the district had fallen. A regular manufactory of crime and criminals seems to have been kept for years by the Vidahu of the village, where cock-fighting, gambling, and arrack drinking were pursued day and night. At length a wretched gambler was deprived of life in the Vidahu's 'hell,' and although all who ought to have aided justice (including the regular police) seem to have done their best to defeat the efforts made to punish the criminals and repress crime, retribution at last overtook the leading wrong-doers. Under the auspices of the Vidahu, at his direct invitation, it would seem a crowd of people, not fewer than a hundred probably, assembled to witness cock-fighting, to drink arrack illegally sold to them, and to take part in gambling. Those who went inside the gambling house actually paid an entrance fee of one shilling each to the Vidahu (the man who had been appointed by government specially to repress such breaches of the law), and he and a henchman of his seem to have held the stakes. It came out in evidence that the man who met his death in the gambling house had placed £20 in the hands of the Vidahu, depositing £8 with the other man. A witness questioned as to the possibility of such large sums changing hands amongst native gamblers, insisted that similar transactions were not uncommon. Be this as it may, the unfortunate gambler, who was excited by drink, asked for some of his money back, and not getting what he considered enough applied insulting terms to the Vidahu. The latter gave the order 'strike,' an order which his assistant readily obeyed, the man was seen to be violently kicked and beaten, and was heard to cry out 'Oh! I am lost!' a hand was seen to take hold of his throat, and then the lamps were overturned. In the darkness there can be no doubt the victim was strangled to death, the post mortem examination disclosing all the usual signs of strangulation, while such violence was used that the larynx was displaced. The Crown, as may be imagined, experienced great difficulty in obtaining evidence, and one of the witnesses had himself the charge of murder hanging over him. The jury, however, though they mercifully acquitted the prisoners of murder, had no hesitation in finding them guilty of manslaughter, a verdict in which the presiding judge said he fully agreed. Mr. Justice Lawson in passing sentence, dwelt on the peculiar atrocity of the conduct of the peace officer in systematically violating the laws he was appointed to enforce. As a warning to other head men an exemplary sentence was necessary. The Vidahu, therefore, would be punished by ten years' imprisonment with hard labor; his companion receiving a punishment lighter by one-half. The surprise and despair of the well-to-do prisoners, who had evidently calculated on an acquittal, were extreme, and we trust the moral effect in Minnangodde and elsewhere will lead to much needed reformation. There can be no doubt that arrack drinking and gambling are at the root of much of the crime committed in Ceylon, and that the police, rural and regular, require, to say the very least, strict looking after."

In looking over the Administration Reports, for 1868, just issued, I find there is no mention of intoxication or drunkenness. I subjoin the statement contained therein of the revenue, derived by

government, sold in the different provinces, to the arrack renters, viz. :—

PROVINCES.	1867-68.	1868-69.
Western,	£70,696 5s. 9½d.	£63,986 5s. 10d.
Central,	49,800 0 0	48,505 0 0
North-Western,	10,823 8 0	12,393 14 7½
Northern,	3,963 0 0	3,629 0 0
Eastern,	4,230 10 0	4,057 6 8
Southern,	1,326 13 4	1,094 14 6
	£140,839 17s. 1½d.	£133,666 1s. 7½d.
Total in American gold, .	\$681,664 88	\$646,943 72

I have the honor to be, sir, with respect, your most obedient servant,

GEORGE W. PRESCOTT, *U. S. Commercial Agent.*

CONSULATE OF THE UNITED STATES OF AMERICA, }
YEDO (TOKYO), JAPAN, July, 1870. }

SIR:—Herein is the report of Dr. J. H. Kidder, U. S. Navy, to whom I referred your letter of February 23d.

Dr. Kidder has spent much time in studying the Japanese, their character and habits, and I take pleasure in forwarding his opinions, knowing them to be the intelligent result of careful investigation.

I am, sir, very respectfully, your obedient servant,

C. O. SHEPARD, *U. S. Consul.*

U. S. STORESHIP "IDAHO," 1ST RATE, }
HARBOR OF YOKOHAMA, JAPAN, July 8th, 1870. }

SIR:—I beg leave to acknowledge the receipt of your letter of June 28th, inclosing a communication (herewith returned) from Dr. Henry I. Bowditch, chairman of the State Board of Health of Massachusetts, which contains certain inquiries concerning the use and abuse of intoxicating liquors in Japan.

I take great pleasure in complying with your request and answering Dr. Bowditch's questions to the best of my ability, although the accuracy which he desires is not attainable in this country as yet, both on account of the peculiar light in which intoxication is looked upon in Japan, and the fact that it has not, so far as I can learn, ever been made the subject of official investigation.

1st. *Saki* is the generic name for all native intoxicating drinks. They agree in that they are all obtained by the distillation of rice, but differ greatly in strength and flavor, according to the degree of dilution and mode of manufacture. While some varieties resemble liqueurs, being of great strength, largely sweetened and highly flavored with aromatic herbs, others, equally intoxicating, are fiery, acrid and unpleasant to the taste, and others still (these the brands in common use), are largely diluted with water, mawkish and slightly nauseous in taste, and not more intoxicating to foreigners than ordinary draught ale or old cider. A specimen of this commoner sort, taken at random, I have found to contain about eleven per cent of alcohol. A brand of especial excellence, known as the Sho-gwats saki (New-Year's wine), and produced only at New-Year's calls, is in flavor and strength not unlike the common Rhine wines. The natives themselves are remarkably susceptible to the influence of saki, and show by flushed faces and excited bearing a marked degree of intoxication after drinking an amount which makes scarcely a perceptible impression upon foreigners. The cups in universal use for saki are exceedingly small, rarely holding so much as a fluid ounce.

2d. The amount of crime which can be directly traced to intoxication in this country is almost inappreciable, and this is due, as I think, to the following among other reasons: first, the mild and inoffensive type of the national character, which impels the people when drunk, rather to dancing, singing and displays of affection, than to combativeness; secondly, the great dilution of the ordinary qualities of saki, almost universally used; thirdly, the small size of the drinking cups mentioned above (perhaps this is rather effect than cause); and fourthly, the state of public opinion, which looks upon intoxication as a misfortune, a species of illness, and not as a legitimate mode of enjoyment, or subject of ridicule.

It is true, that occasionally one of the drunken *samourai* (class entitled to wear two swords) will on meeting with foreigners, actuated by his early prejudices and military training, draw his sword, and make an attack, which would have been refrained from had he been sober. But such instances are exceedingly rare, and when they do occur it is still more rare that mischief is not prevented by his perhaps equally drunk but less quarrelsome companions. During a residence of more than two years in Japan I have frequently been with the Japanese of the better and more dangerous class, at their convivial meetings, sometimes alone, and although they have generally ended by getting tolerably drunk, I have never seen swords drawn, or any exhibition of ill-temper or malice. Twice in

the streets of the native cities I have seen drunken Japanese officers attempt to draw their swords upon foreigners, but in neither case did any ill-result follow, their friends interfering almost before the action could be noticed. Quarrels among themselves caused by drinking are exceedingly rare. As for other kinds of crime, I have yet to hear of the first instance of a connection between such and drunkenness.

Like all Eastern nations the Japanese are exceedingly temperate. Habitual drunkenness is almost unknown. At the general holidays, which occur about forty times a year, and at private family festivals, all the natives, men, women and children, drink more or less saki, but at other times they rarely touch it. Saki is brought out at the family festivals, is drunk with great ceremony at funerals, and on special occasions of jollity, but is rarely allowed to interfere with business or labor. Last month there was an unusually important *Matzri* (festival) at Yokohama, to the Goddess of Heaven, the ancestress of the Mikado dynasty. This holiday lasted for three days, during which it is safe to say that the entire native population of Yokohama was more or less intoxicated. The streets were crowded with processions and shouting bands of men with flushed faces, capering, singing and playing practical jokes. With all this drunkenness, there was not a single instance of assault, much less murder, reported. Comparing this result with that of a 4th of July in America, or with similar holidays in other countries, I cannot hesitate in declaring that not only is the comparative intoxication of this country less in degree than that of other nations, but that it differs in kind, leading to few or none of the evils to society which have caused the temperance movement at home.

Since the government has never recognized drinking as a cause of crime, or as a greater evil than any other excess, it has never been made the subject of official investigation, and there are therefore no official statistics.

I am sir, very respectfully yours,

J. H. KIDDER, A. M., M. D.,

Asst. Surgeon U. S. Navy.

C. O. SHEPARD, Esq., *U. S. Consul*, Tokai, Japan.

UNITED STATES OF AMERICA LEGATION, }
YOKOHAMA, JAPAN, June 20, 1870. }

DEAR SIR:—Your communication of the 23d of February, 1870, propounding the following inquiries, to wit:—

1st. "What are the chief intoxicating articles used in Japan?"

2d. "What amount of crime is produced by them, and their

effects on health and prosperity of the people?" and also, asking my opinion as to the relative amount of intoxication in this country, &c., is now before me.

In reply to question No. 1, my answer is Saki, a liquor brewed from rice.

In answer to the second question, having no statistics to guide me, I can only answer it relatively by saying: less crime resulting from intoxication occurs here than any other country I ever was in, and less evil effects upon the health and prosperity of the people from this cause is observable than in the United States.

This is not a country in which any statistics in regard to this matter are obtainable, but after receiving your letter, I conferred upon the subject with a number of gentlemen of long residence here, and close observation, and from them I learned that their convictions coincided with my own as already stated, and as follows, to wit: The free use of intoxicating drinks is allowed all classes of Japanese people by law, the original object of allowing which was to prevent their resorting to the use of opium as the Chinese do, and it succeeded, as opium is not used by this people. Secondly,—the people are rigidly and by birthright divided into castes, the upper class or Samourai commencing with the Emperor, concludes with the private soldier, all of whom constantly wear swords and never perform manual labor. The second class includes farmers, mechanics, merchants, and thus on down to Coolies, in the order here stated. They perform all the labor of the country, are not eligible to any office, and hold their lives and property by a very delicate thread that this upper class stand upon little ceremony in severing, if sufficient excuse is offered; hence this lower class, from sheer fear of offending some of the Samourai, and meeting with severe and summary punishment, are not addicted to drunkenness, in which condition they would be most liable to do or say something that would bring punishment upon them. Any member of the Samourai class, although but a private soldier, is eligible to any office in the gift of the Emperor, and generally all offices are filled by men promoted for their skill or wisdom. To be known to be addicted to drink, or even to be seen once intoxicated, would have the effect to seriously diminish the chances of one's promotion, and as they are generally an ambitious and aspiring people they avoid this evil in aid of their ambitions, and besides this as they rarely quarrel without fighting, and as all of them go constantly armed with most formidable weapons, they avoid drink as likely to produce fighting, and fighting with them means the death of one or the other of the antagonists. Thus sobriety is the rule and intoxi-

cation the rare exception with this people. My Secretary, Mr. A. L. C. Portman, who has been a constant resident here now some ten years, and has mixed very much with all classes of the people, assures me that Japanese women make no use of intoxicating liquors at all, and that he has during his whole residence never seen but one Japanese woman under the influence of liquor. Regretting that I am unable to furnish you with any statistical information as requested, and apologizing for the meagreness of the information hereby given,

I remain, yours most truly,

C. E. DeLONG.

P. S. Since writing the foregoing I have met and conferred upon the subject with Doctor Hepburn, a missionary gentleman and a physician here of the highest repute, who has lived here a long time, keeps a dispensary, and has many Japanese patients, and from him I learn that drinking is much more frequent than I supposed amongst the Japanese, who as he says quietly drink at home very considerably, both men and women, but as the intoxicating qualities of Saki are only about equal to lager-bier, it is used almost as a beverage, and but little evil consequences comparatively speaking are produced by its use. This information I deem most reliable and therefore send it with my own views.

Yours, respectfully,

DeLONG.

AGENCY AND CONSULATE-GENERAL OF THE U. S. OF A. IN EGYPT, }
ALEXANDRIA, July 25, 1870. }

DEAR SIR :—Your queries in behalf of the State Board of Health, regarding the influence of intoxicating drinks on the health and prosperity of our people, addressed to me at Calcutta, have been received in Egypt, to which country my government was pleased to transfer me.

I will, however, cheerfully answer the questions to the extent of my ability.

1st. The chief intoxicating articles are, "arrack," champagnes and red wines.

This being a Mohammedan country, drunkenness is almost unknown, and confined entirely to the foreign Christians residing here.

2d. Crime is almost entirely committed by the foreign population, and altogether so when it is caused by drunkenness. Murder, theft, rape, burglary, forgery and other grave crimes are monopolized by the Greeks, Italians, French and other Christians resident in Alexandria and Cairo.

Of course, under these circumstances there can be no relative amount of intoxication between the two countries. In the United States and England, the capacity to hold a vast quantity of liquor is taught as one of the highest attributes of manhood. In this benighted land, to be drunk involves the most extreme social and religious disgrace. And while the teachings of the Prophet hold sway, there is no prospect of these infidels becoming civilized in that respect.

3d. There are no statistics of intoxication and crime in this country; the records from the Christian nations will therefore have to furnish warnings to the good people of the grand old Commonwealth of Massachusetts which in matter of temperance may proudly say she is almost Mohammedan.

I remain, with the highest respect, your obedient servant,

GEORGE H. BUTLER.

CONSULATE OF THE U. S., ISLAND OF ZANZIBAR, }
May 21, 1870. }

DEAR SIR:—I received on the 18th inst., your letter of February 23, 1870, asking information as to,—1st. What are the intoxicating articles used in Muscat? In several visits to that place I have never heard of or seen anything of the kind, but once, on which occasion a vessel arrived from Mauritius with about sixty casks of rum. At Zanzibar the Arabs drink German gin and French cognac of the vilest description, and the negroes cocoanut rum of their own manufacture. 2d. What amount of crime is produced by them, and their effects on the health and prosperity of the place?

As the religion of the people is Mahometan, which forbids the use of intoxicating drinks, those who use them do so in secret, taking care to confine their appetites within bounds so as to retain the outward respect of each other, and we only see drunkenness when English or American sailors are on shore here. No comparison therefore is possible between the two countries. I believe that intoxication seldom if ever, leads to crime in these dominions.

I am, sir, very respectfully yours,

• FRANCIS R. WEBB, *U. S. Consul.*

UNITED STATES CONSULATE, CAPE HAYTIEN, }
July 1, 1870. }

DEAR SIR:—I have to acknowledge your circular of February 23, which reached me only on the 14th June, and I have now the pleasure to reply to it.

Before entering however upon the proposed questions, I find it necessary to make a few preliminary observations. Intoxication by ardent drinks and other narcotic drugs, alike with smoking, as a general vice, presupposes an advanced state of society, when men strive to forget the realities and hardships of life by over-exciting their nervous system. For, the proper use of drinks is, to quench thirst; and for this purpose, nature has afforded to man, one of her richest and most abundant gifts, the limpid, cooling and enticing draught of springs, wells and rivers, which abound nowhere more than in the West Indies.

The masses of pure African descent in Hayti are a semi-civilized race, of the simplest tastes and habits; their wants are few and amply provided for by the fertility of the soil, their undisputed property. As a general rule they have rather an abhorrence for strong drinks, to the use of which only habit and social intercourse lead. Living isolated in their mountain fastnesses, and in no or little contact with foreigners, nor even with the inhabitants of the ports, the habit of convivial meetings lacks encouragement.

To reply to query 1, the chief intoxicating drink of Hayti is cane-spirit, called here "Tafia." At the time of French colonial rule until Christophe, cane sirup was only used for the production of sugar; distilleries for the production of spirits were scarce. Since the independence of the island and the cessation of sugar boiling, most of the sirup goes to the distilleries (guldives), which were then established in districts favorable to that particular industry, and "tafia" became the general stimulant drink.

But the character of the masses and the paucity of the "guldives" over a vast area of inhabited plains and hills, the constant repetition of civil contests almost in every decennium, interrupting and ruining industrial enterprise, prevented the development of the propensity among the masses. The chief consumption remained confined at the seaport towns to sailors, foreigners and such Haytien half-breeds who had visited Europe and imported European habits. Under the late government of Salnave, the commodity became so scarce that a law was passed to import foreign rum, free of duty, I suppose under the then circumstances of the country, with very small results.

Query 2d. Hence there may be, though rarely, drunken frays between sailors and other habitual tipplers, but within my knowledge, I never heard of the committal of any serious crime by negroes in consequence of immoderate drinking.

Polydipsia and inebriety, as effects of a morbid state of health, such as hypochondriasis, hysteria, &c., are, in a country where

morals and sexual intercourse are unrestrained, almost unknown. On the other side, diseases consequent on immoderate use of ardent liquors, such as dropsy, scirrhus ventriculi, delirium tremens, consumption, are of rare occurrence among Creoles. The general health is favorable, when compared with other similarly constituted countries. Cholera never touched these shores, whilst desolating almost all the surrounding islands.

In spite of the political turbulence since the liberation from French rule, the people live at ease, and generally prosper. Statistical accounts in a country where the population are from time to time decimated by civil war, and an organized administration is impracticable, are out of question. I shall however endeavor to collect materials in my district, where I am only a short time located, for further communication.

I remain, very respectfully yours,

ABM. CROSSWELL, *U. S. Vice-Consul.*

LEGATION OF THE U. S. A., NICARAGUA, LEON, }
May 15, 1870. }

DEAR SIR:—I regret that, in reply to your letter of February 23d last, received the 1st instant, I am unable to furnish you with any statistics or definite information on the interesting subject alluded to therein.

As in all Spanish-American countries, so in Nicaragua, the government has monopolized for itself the sale of strong liquors. The article almost exclusively used by the mass of the people is rum, made of sugar-cane, sold and drunk perfectly pure and unadulterated. The higher classes indulge in the vilest stuff imaginable, imported mostly from France as cognac, champagne, &c., &c.

There are remarkably few cases of drunkenness noticeable in public and among the lower classes, who drink rum, while, for good reasons, I always found it wise on occasion of banquets, dinner or other parties, both public and private, among the higher classes, to withdraw at an early hour. If the native rum, which seems but in exceptional cases to be indulged in to excess, has any injurious effect on the health and prosperity of the people, which I am rather inclined to doubt, it certainly is very insignificant.

During a residence of nearly seven years in Central America (Costa Rica and Nicaragua), I do not think that half a dozen of unfortunates, bent upon self-destruction by strong drinks, among the natives, have fallen under my observation.

I am most confident that the amount of intoxication in this coun-

try falls immensely short of that seen and not seen in our own land. Even here, I regret to say, our countrymen are by no means distinguished for sobriety.

I have heard it asserted, both in Costa Rica and here, that delirium tremens is never the consequence of excessive indulgence in rum, but will inevitably follow as soon as the rum-drinker turns to foreign, i. e., European and American strong liquors.

I have the honor, sir, to be your obedient servant,

C. N. RORTZ.

U. S. CONSULATE, ST. CROIX, W. I., }
June 18, 1870. }

SIR:—Yours of February 23d has been received. In answer to your first question, I would inform you that the “chief intoxicating articles used in Santa Cruz,” are rum, brandy, wines and malt liquors, all of which, except the rum, are imported from Europe. The rum is manufactured here, and is the almost only intoxicating drink used by the laboring population. The higher classes only use wines and malt liquors, and brandy more than rum.

It is impossible for me to answer your second question with any degree of satisfaction, as there are no statistics on this subject published here. Crime of a serious character is very uncommon. Pilfering produces most of the tenants of our prisons, and I believe there is no country in the world where one is safer from assault and robbery than in the island of Santa Cruz. This results, doubtless, in some measure, from our isolated position and the difficulty of escape. “Rum-shops” are abundant, and rum is sold at them in any quantity down to one cent’s worth. Still I am of opinion that drunkenness is less common with the laboring classes than in the United States. An exhibition of it in the streets is certainly less common. This, however, may be owing in part to police regulations and the fear of arrest. I think the effect of the use of intoxicating drinks is more apparent among the higher classes. Wines and liquors are used at all social gatherings very freely, and by a considerable number of the people at all times too freely. That the effect is pernicious to health, and injurious to the prosperity of those who thus indulge their appetites, I know from personal observation. I do not think, however, any amount of crime is produced by the use of spirituous liquors. Upon the whole, I am inclined to the opinion that the use of intoxicating drinks is much more *universal* here than with us, and that intemperate drinking

is more common among the higher, and less common among the lower classes than in the United States.

I am, sir, with great respect, your obedient servant,
E. H. PERKINS, *U. S. Consul.*

TORONTO, ONTARIO, April 17th, 1870.

I have to acknowledge the receipt of your communication bearing date 23d February, 1870, and, in reply, briefly give you such information as seems to me pertinent to the subject you have under advisement.

In reply to your first inquiry, "*What are the chief intoxicating articles used in Canada?*" I answer, that brandy, gin, whiskey, sherry, champagne, together with the various kinds of ale and beer, make up, in the main, the list of "intoxicating articles" used in Canada.

In answer to your second inquiry, "*What amount of crime is produced by them, and their effects on health and prosperity of the people?*" I have to report that, in my judgment, founded on large observation, *ninety-eight per cent.* of all the crimes committed here grow out of the use of intoxicating drinks. In the police court of this city the daily arrests vary from five to twenty. I have very frequently visited the same, and I do not now recollect a single committal to have been ordered, or a fine imposed, since I came here, where the prisoner was a consistent temperance man or woman. Intemperance *almost invariably* lies at the bottom of all the crimes which swell the criminal calendar of this city and entire Province.

As to the relative amount of intoxication in Canada and that seen in the United States, I may say that it would be difficult to determine what ratio there was between the two countries, owing to the difference in the quality of the intoxicating drinks used. In Canada, as a general rule, liquors are cheaper and purer than in the States, and as a consequence more can be used with less apparent injurious effect here, than would be possible there.

Pure liquors do not affect the habitual drinker as do the vile compounds sold in such alarming quantities in the United States. There is a marked difference in the effect produced by pure and drugged liquors. In the one case, the effect is the reverse of the other. One using drugged liquors seems to be for the time in a state of frenzied insanity.

The general use of wines and liquors in Canada, as a social

custom, is in marked contrast to the growing abstinence in many of the leading families in the States.

Intemperance here, as is the case everywhere, breeds crime, and daily leads to the committal of monstrous wrongs. The subject you have in hand is one of very great importance to society the world over, and I am sincerely sorry that pressing duties will not permit me to more fully develop an inquiry almost boundless in its bearings.

Sympathizing most fully as I do in your researches, as set forth in the circular you forwarded me, I shall look with interest to the results of your labor. The social problems of the day are the great questions of the age, and he who succeeds in providing a practical remedy for the evils now threatening the future prosperity of our body politic, will earn for himself the commendation of all mankind.

Faithfully yours,

A. D. SHAW, *U. S. Consul.*

UNITED STATES CONSULATE, TRINIDAD DE CUBA, }
April 11, 1870. }

SIR:—On the ninth instant I had the honor to receive your communication dated February 23d, requesting information toward elucidating the subject of the “influence of intoxicating drinks on the health and prosperity of the people of the United States,” and I cheerfully give you the little information which I possess in behalf of a subject of so great an importance.

With regard to question 1st, “What are the chief intoxicating articles used in Trinidad or vicinity?” I would reply, that the usual intoxicating drink made use of here is called “aguardiente;” it is distilled from molasses, is sold at a cheap rate, and is made free use of, not only for drinking, but also for bathing.

This liquor, although used so freely as a drink by the poorer class of whites, and the blacks, yet I must in justice add, that notwithstanding its liberal use, it is very seldom that it is drank to excess, so much so, that it is an extremely rare thing to see a person intoxicated in the streets.

The cheap claret wine from Spain (principally from Catalonia) is made use of here very generally at meal times, but scarcely ever is drank to cause intoxication. Indeed, it is a fact which has often attracted my attention, that in a country where intoxicating drinks are to be had so cheaply as to be within the reach of every one, and I may say, in such general use, that so very few cases of drunkenness are seen. This, I conclude, is in part owing to the fact that an

habitual drunkard is looked upon by these people with disgust and contempt. One may be a gambler (and there are a hundred of them to one habitual drunkard), or anything else immoral and improper, and this will not deprive him of a respectable position in society, whilst to be a drunkard is almost an unpardonable sin.

With regard to question 2d, "What amount of crime is produced from the use of intoxicating drinks, and the effects on health and prosperity of the people?" would say, that really in this town, where I have resided for thirty years, the amount of crime proceeding directly from the use of intoxicating drinks is so small that I can safely say that it does not amount to one per cent. of the total of crimes from all causes. Consequently I may say that the "prosperity" of the inhabitants is scarcely affected, if at all, from the effects of intoxicating drinks. I would add that a large number of coolies have been imported into this island, and that they are much addicted to the use of opium; this is the cause of the death of many of the coolies, and also, under its influence, or from its effects, they commit many crimes, and I have no hesitation in saying that there are fifty deaths among the coolies from the effect of opium, to one amongst the creoles from that of intoxicating drinks.

With regard to the "relative amount of intoxication in this town compared to that seen in the United States," you may well infer from the foregoing that the latter country must suffer most lamentably from the comparison. It is impossible for me to remit any "official statistics of the amount of intoxication and crime resulting therefrom," as you request, as no such records have ever been kept here to my knowledge.

In conclusion, would say that I wish to be understood as referring to this city (Trinidad de Cuba) exclusively in the foregoing observations, and with my best wishes for your cause,

I remain, your obedient servant,

HORATIO FOX, *Consul.*

LEGATION OF THE UNITED STATES OF AMERICA, }
LIMA, PERU, May 22d, 1870. }

DEAR SIR:—I have the honor of acknowledging the receipt of your letter, dated the 23d of February last, inquiring, 1st, "What are the chief intoxicating articles used in Peru?" and

2d, "What amount of crime is produced by them, and their effects on health and prosperity of the people?"

In answer to the first question, I may briefly say that all kinds of European liquors and wines are used in Peru. To those may be

added "Italia" and "Pisco," Peruvian brandies, made from the grape, "Chicha," made from maize, and similar in taste and character to the beer in our whiskey distilleries after the fermentation.

The wines of the country are very fair, but still the higher classes mostly use foreign importations, and at their tables, Bordeaux, sherry, and on special occasions champagne, will be found.

Your second inquiry is more difficult to answer. As a people, the Peruvians are much more pacific than our own, and crime is not so common. After six years' residence in Lima, a city containing 180,000 inhabitants, I have only seen one assault and battery—only four or five homicides have been committed, and pickpockets are unknown. The newspapers also show that such occurrences are very rare.

The Peruvians are far less given to drunkenness than the people of the United States. Among gentlemen such offences are of rare occurrence, and foreigners certainly excel them in all such "gentlemanly vices."

As to the health of the people, I can only state that I believe the average age of adults in Lima far exceeds that in the United States. From appearances, it would not be difficult to find in Lima at least one hundred persons over one hundred years of age. *

Temperance societies are unknown here, and all drink who have the means to pay for it. My impressions are, that the use of light wines, and "Chicha," in this climate, add to the cause of temperance and health, by banishing the stronger alcoholic beverages and giving tone to the stomach and circulation of the blood. Life here seems to me torpid, and stimulants necessary.

As there are no statistics of intoxication and crime, except as stated in the daily journals, I regret that my reply to your note could not be more thorough and satisfactory.

I have the honor to be, your obedient servant,

ALVIN P. HOVEY,

*Envoy Extraordinary and Minister Plenipotentiary
of the United States of America to Peru.*

PARA, 23d May, 1870.

DEAR SIR:—I am in receipt of your communication of 23d Feb.; illness has prevented my replying to it sooner.

1st. The chief intoxicating article used in Brazil is "Cachaça," rum (made from the sugar cane).

2d. In the absence of statistics, it is impossible to give a satisfactory reply to your second interrogatory, but habitual intoxication

is rare in Brazil, and is, I may say (of course with individual exceptions), limited to the lowest class of the population. Even among these it cannot be said to be prevalent. The blacks will get drunk sometimes, but even among them the vice is not general. Our country population, the Sapuyos or civilized Indians, are as a rule temperate, but they will all get drunk on certain "festas" (Church holidays), when they gather from miles around at the district chapel.

You will observe that my observations apply more particularly to the Amazonian provinces, but I have resided in the south as well as in the north of Brazil, and with exception of the reference to the Sapuyo, a race found only on the Amazon, I believe they may be applicable to the country generally.

The word "bebado," drunkard, is a term of great reproach—in the cities, it is too often and too justly connected with the word "Inglez," and I am sorry to say that the national designation properly includes our own countrymen.

A great deal of porter and ale is consumed in the country, imported from England.

There is a festa held yearly at a chapel in the suburbs of this city; last year, on the principal night, when I think not less than from 10 to 15,000 people of all classes were assembled in the square, I passed through the crowd, and observing carefully, could not find one drunken man; nor was there any *row* nor any fight; later in the evening two drunken men appeared, both *respectable* foreigners.

With these exceptions, I do not remember to have seen more than two men (one a slave) drunk in the streets during the past six months.

You will see from these remarks that no comparison can be made as to the amount of intoxication in this country, and the extent of the national vice which so sadly disfigures our own.

Very respectfully, your obedient,

JAMES R. BOND, *United States Consul.*

It is proper that I should add, that the consumption of "cachaça" is large,—there is a grog-shop at almost every corner, not limited however to sale of liquors. How it happens that there are so many moderate drinkers and so little drunkenness I cannot tell.

CONSULATE OF THE UNITED STATES OF AMERICA, }
AT PERNAMBUCO, July 1st, 1870. }

DEAR SIR:—I have the honor to reply to your inquiries as far as I can gather them, viz:—

The chief intoxicating drink of this city and province, is the

liquor distilled from the sirup of sugar-cane, commonly called cance, or Brazil rum; there is quite a large quantity of it distilled in this province, but it is not all consumed here; a considerable quantity of it is exported to the south.

Most of the natives drink this, particularly the lower classes, as it is cheap, the cost being about forty cents per gallon. The crime that is produced from this drink, so far as I can learn, is very small. A person may travel through the streets of this city, for a week, and in fact the province (I have travelled much through it), and not see a Brazilian intoxicated.

Most of the crime that is committed through the influence of strong drink is by foreigners, principally seamen, and that only trifling cases of assault and battery.

Most of the foreigners that reside here are English, German and French. The English and Germans drink more or less beer, which is mostly imported from Europe. Many of the English drink brandy, and other intoxicating drinks, which has a bad effect in this hot climate, producing fever, and often death with the continued use of strong drink and exposure; although this is a healthy port, and clear of all contagious diseases, and has been since I came here, and for several years past, as I have learned.

I think the use of rum, or ardent spirits, is no detriment to the prosperity of the people, as they do not use it yet to excess, but the use of it is increasing, and may in time reach to bad results, as the manufacture of it increases yearly.

The most of the crime committed here is caused from jealousy and revenge, and done in cool blood; not intoxicated, hot and angry with spirit as in our country, but premeditated and cool; mostly of a dangerous character.

I have known several persons stabbed since I have been here, from jealousy, which is the cause of most of the capital crimes that are committed; not from drinking spirit but in the coolest manner, by attacking the party unsuspected and dealing a dangerous blow.

As to the amount of intoxication between this country and ours, there is no comparison, for here you seldom see a drunken man.

I came from the city of Philadelphia, where most of the crime is caused by intoxication, or the effects of it, and here none comparatively, so little that it caused me to make close observations as to its effects on the habits of the people. As for statistics of crime on account of drunkenness, I think there are none, at least in this city that I can find; if there is any crime from intoxication it is recorded from other causes.

I hope the above will be satisfactory, as it embraces most of the facts, as near as I can gather them from observations and statistics.

I am sir, with the greatest respect, your obdt. servant,

SAMUEL G. MOFFITT, *U. S. Consul.*

U. S. CONSULATE, SAN JUAN DEL SUR. Now at CORINTO, }
May 27th, 1870. }

DEAR SIR:—Yours of February 23d is received, and I cheerfully give you such answers to your questions as I am able. I should say, however, that my facilities are not good for getting accurate information on the subject in question, as my business confines me the greater part of the time at this port, a town of small population.

The *chief*, and almost the only intoxicating drink used by the *masses* of the people in this Republic is *new rum*, manufactured from cane molasses. It is a government monopoly, made by contract, at about forty-five cents per gallon, and sold by the government for \$2. From this it derives an important revenue. The wealthier classes use cheap brandy. Claret wine is used quite generally, and I think a considerable amount of other wines, among those who can afford it.

No *statistics* of crime can be obtained resulting from this or other causes, but my impression is that intoxication here gives about the same proclivity to vice as elsewhere.

There are *very* few people here who are strictly temperate and very few who can be called inebriates, but I am quite positive that there is far less intoxication here than in the United States, and vastly less evil resulting therefrom. My opportunities for *general* observation in neither country would qualify me for giving a reliable statement of the relative amounts.

I am sir, very respectfully yours,

RUFUS MEAD, *U. S. Consul.*

CONSULATE OF THE UNITED STATES OF AMERICA, }
TRIESTE, October 13th, 1870. }

DEAR SIR:—Some months since I had the honor to receive from you a circular letter requesting information upon the influence of intoxicating drinks on the health and prosperity of the people under my daily observation, your inquiries being given under two general heads, to which I will reply after a preliminary remark or two.

Trieste (proper) contains a population in round numbers of about 90,000 souls. It is not only the principal seat of commerce

on the Adriatic, but of a large manufacturing industry. It has extensive iron-works, large ship-building establishments, and a great number of coopers' and cabinet-makers' shops. The want of dock and wharf accommodations, and of machinery for the manipulations of its immense grain and lumber commerce compels the employment of a very large number of lighter-men and laborers, not needed in American ports. Again there are rarely less than a hundred vessels in port—not counting of course, fishing smacks and the like, and I have known the number to reach 430. The arrivals of sailing vessels in 1869 were in number 7,376, of which 1,725 were from ports outside the Adriatic; arrivals of steamships 1,719, more than two-thirds of which were from ports outside the Adriatic—mostly large vessels of 800 to 2,000 tons. We have, therefore, seldom less than 500, often 2,000 or more seamen in port. No English or American (Atlantic) sea-port has so large a number of laboring men in proportion to the whole population, as Trieste. As boarding-houses (in the American sense of the term) are unknown, the unmarried and a large proportion of the married men collect in the eating-houses for their supper, when the day's work is ended, and are thus exposed constantly to the temptation to indulge in strong drink.

The "liquoristas" scattered through the town to the number of seventy-eight, correspond to the old American "bar-rooms," except that they are not connected with the inns. They are independent shops and furnished in all degrees of elegance. All sorts of liquors and high-priced foreign wines are sold by the glass in those of the higher class, ordinary liquors only in the lowest, but no common wines or beer. How these liquoristas exist is a mystery to me, for in the many I pass daily, I seldom see more than three or four persons, and the gulping down of glass after glass of brandy, gin or rum is utterly unknown among the native population. The glasses used are exceedingly small, and the liquor, usually unmixed with water, is sipped slowly at intervals, as a gentleman with us takes his maraschino after dinner. Mixtures like "juleps," "cobblers," and the other wonders described by English tourists in the United States, are unknown.

The "Osterias," one hundred and eighteen in number, are the ordinary eating-houses of the middle and lower classes of the people. In them, as a rule, I believe without exception, no drink but wine is to be obtained; the light red and white wines from neighboring districts, drawn from the casks.

The "Trattonas" and "Birrarias," restaurants and beer-houses, rank higher than the last, and are in the main supported by the

mercantile class, the officers of the army and navy, and generally the Teutonic in contra-distinction to the Italian and Slavonic population. Beer is the principal beverage in these fifty-five establishments, though wines are also furnished, and the occasional demand for a small glass of cognac or other fine liquor is supplied.

In the fifty-four coffee-houses also, all the finer liquors and spirits are dispensed, but invariably in the smallest of "portions."

In the hotels are no bar-rooms, but the guest is supplied, at table or in his room, with whatever beverage, from beer to brandy, he may demand.

It will be seen from the above that no restraint whatever is imposed upon the purchase of spirituous liquors, except that in the licenses granted to the lower classes of eating-houses, the proprietors are deprived of the power of tempting to drunkenness by the sale of anything except wines or beer.

The following tables, drawn from the very exact records of the Chamber of Commerce, will give a fair view of the consumption of beer, wines and liquors by this population of 90,000. Everything of the kind that enters the city by sea or land is recorded in "centner," hundred weights.

YEARS.	Imports by sea and land of Alcohol and Spirits, Rum excepted, cwt.	Exports, cwt.	Excess of Imports, cwt.	Imports of Rum, cwt.	Exports of Rum, cwt.	Excess of Exports, cwt.
1860, . . .	190,950	171,802	19,148	9,374	33,440	24,066
1861, . . .	163,829	140,515	23,314	12,224	29,946	17,722
1862, . . .	156,364	110,613	45,749	10,997	32,976	21,999
1863, . . .	159,150	189,260	19,890	2,657	33,867	30,680
1864, . . .	209,574	182,988	26,587	5,275	39,466	34,181
1865, . . .	199,079	171,060	28,019	4,225	39,476	35,251
1866, . . .	181,872	160,988	20,884	6,754	32,056	25,302
1867, . . .	179,890	163,805	16,085	2,668	31,636	28,968
1868, . . .	256,588	226,108	29,171	7,538	43,681	36,143
1869, . . .	274,239	224,230	46,431	1,340	60,982	59,642
	-	-	275,278	-	-	318,954
Excess of Export, 88,675						

There are no distilleries in Trieste; making due allowance, therefore, for the ordinary consumption of alcohol in manufactures, the great excess of the export of the mixture here called "rum" over the import of the real article, reduces the amount of spirits used as

a beverage to an exceedingly small quantity. That is to say, statistics, also, prove that spirits are in no form a common drink of any class of people in this city.

Total Imports and Exports by Sea and Land.

YEARS.	WINE.			BEER.		
	Imports, cwt.	Exports, cwt.	Excess of Import,cwt.	Import by land, cwt.	Export by sea, cwt.	Excess of Import,cwt.
1860, . .	173,976	47,237	126,739	71,475	21,958	49,517
1861, . .	106,599	47,791	58,808	82,520	28,091	54,426
1862, . .	137,421	30,395	107,026	84,081	32,207	51,874
1863, . .	176,028	30,514	145,514	72,924	29,025	43,899
1864, . .	180,045	33,139	146,906	72,704	29,920	42,784
1865, . .	183,781	36,414	147,367	84,978	40,167	44,811
1866, . .	214,030	30,198	183,832	73,879	51,273	22,606
1867, . .	192,854	37,009	155,845	93,614	48,669	44,945
1868, . .	194,525	44,738	149,787	113,856	68,413	45,443
1869, . .	208,667	60,449	148,218	137,028	71,377	65,651

[N. B. The discrepancy in the beer statistics for 1866 is caused by the opening of a splendid new brewery, just back of the town, in the spring of that year, the product of which does not appear in the figures that season, except partly in the column of export.]

These tables and the preceding remarks afford a full answer to query 1 of your circular, viz. : that wines are the chief intoxicating article used in this part of Austria. So far as my observation extends, no person intoxicates himself on beer, and very few, if any, upon spirits.

As to the second question, "What amount of crime is produced by intoxicating liquors?" I have to report that no statistics bearing on this point have been kept at the police office, and that a police commissioner with whom I conversed on the subject is of opinion that the amount of crime directly traceable to the use of liquor is trifling, if any. The few drunken brawls, which arise in the course of the year, and cause arrests for assault and battery, are for the most part confined to the crews of *American* and *English* vessels.

The drinking of wine and beer is universal. Oil is used in cooking and at table in great quantity, but very little vinegar; and light, sour table wines are the corrective. From infancy to age they are the common beverage, but are generally, as by Homer's heroes, mixed with water.

As I have been home but once (1863), and then only for a period

of seven weeks, since 1858, I am not competent to offer an opinion upon the comparative amount of intoxication here and there. I can only say that at that time, the American bar-rooms in New York, Washington and Boston, so frequented by respectably dressed people, and especially young men evidently of the better classes of society, pouring down spirits of all sorts, caused me a feeling which I can only describe as one of horror.

Here in Trieste, on the evenings of Saturdays and holidays, one may see a pretty large number of the laboring class of people intoxicated, but they are always "jolly drunk," not "savage drunk,"—in my view a broad distinction. They make night hideous in the cheap eating-houses and occasionally in the streets, by the unearthly yelling which they suppose to be singing, and wordy wars are not infrequent,—though even in this a stranger easily mistakes—and at the moment he expects to see a blow, he hears a burst of laughter. Addison wrote 170 years ago of the Italian recitative—"I have often seen our audiences extremely mistaken as to what has been doing upon the stage, and expecting to see the hero knock down his messenger, when he has been asking him a question; or fancying that he quarrels with his friend, when he only bids him good-morrow." On Saturday and Sunday evenings the laboring men, often with wives and children, sup together, as before remarked, in the public house, drink wines at a cost of less than 60 cents (gold) per gallon, to various degrees of intoxication, reel home supported by wife or friend, sleep off the effects, and next morning go to work as usual. Getting savagely drunk and going home to abuse and beat wife and children, is something unknown here.

Turning to the better classes of society, I have to remark that no instance is known of a merchant, lawyer, physician, shop-keeper or master-mechanic, becoming an inebriate and gradually losing position, property and business, and sinking into a drunkard's grave. That is to say, among the native population; for there have been three or four instances of Englishmen becoming more or less confirmed sots. One remarkable case of a man who sank so low as to sell his wife's and children's clothing for spirits, who became a nuisance to the family into which he married, and to the police, who reeled about the streets, lay in the gutters, and at last died in the common hospital at Naples, may be mentioned. He was an American.

There are no official statistics of the "amount of intoxication and of crime resulting therefrom" obtainable for Trieste; but upon a comparison of my observations here during the last six years,

with my recollections of those made between 1840 and 1850 at Cambridge and Boston, I should consider it a most happy change could the spirit drinking of Boston be bartered for the wine and beer drinking of this city. As I rarely taste anything intoxicating, I am in so far a disinterested witness.

I am, sir, very respectfully, your obedient servant,
(Signed,) ALEXANDER W. THAYER, *U. S. Consul.*

N. B. I find an omission in connection with the tables, viz., that the "centner" of export is the hundred-weight of Vienna; that of import the hundred-weight of the customs. The former is twelve per centum greater than the latter.

The following interesting letter is from the venerable Dr. Christison of Edinburgh:—

EDINBURGH, 26 July, 1870.

DEAR SIR:—When your letter of 23d February arrived here, requesting information about drunkenness in Scotland, I was confined by illness, and for some weeks in order to keep my University work going it was necessary for me to take great care by avoiding and postponing as much as possible of my other rather manifold duties. Thus it happened that I had to delay replying to your letter, until my undischarged debt to you has been brought up before me by the accidental discovery of the letter, and an unfinished answer, this morning. I fear the information I have to give you may be too late for any practical use you might have intended to put it to. But nevertheless I must not let you go on supposing, as you were well entitled to do, that I have been utterly regardless of your request.

I have several times bethought me how I could best give you a clear idea of the extent and evil effects of excess in the use of stimulants among my fellow-countrymen. The conclusion I have come to is to discard the favorite statistical method of inquiry among modern enthusiasts, as being full of fallacy, and apt to lead to dangerous and blundering practical conclusions. I am sure that you and your friends of the Massachusetts Board of Health will come much nearer the truth of things, if I tell you the general result of the observation of a long life, during which my attention has been seldom long withdrawn from the evils of drunkenness in various branches of the population of Scotland. There are really no statistical returns on the subject which are worth their cost in paper and ink.

In the first place, you ask "What is the chief intoxicating liquor used in Scotland?" The foremost is whiskey; the next is whiskey; the third is still whiskey; and any other is "nowhere," in racing phraseology. When the vice of drunkenness commences in any one of the middle or upper walks of life, wine may set it agoing; but that vehicle is soon changed to brandy, or to whiskey. Among the working classes there is no other from first to last than whiskey. Beer, a common intoxicating liquor among Englishmen, is not in use as such in Scotland. In the middle and upper ranks it is very widely used in moderation as a beverage during dinner, when wine is not taken. Scottish workmen unfortunately use it extremely little in that way, but, if they take any stimulant dietetically, it is whiskey; and hence the passage to excess is too easy. I do not recollect in fact to have ever seen a beer-drunk Scotsman but once; and that was an unfortunate gentleman of high reputation in a learned profession, who gradually fell into "rambles" of continuous drinking, and who, on one of these occasions, when the ladies of his house in the country had carefully locked up every bottle of strong drink they could think of, ferreted out, and got drunk upon, nine bottles of the smallest of small beer.

During last century the habit of frequent and extreme intoxication prevailed very much in all ranks of life. When one regards indeed what has been handed down of the correlative practices of the day, it is scarcely possible to avoid the conclusion that the upper and middle ranks, and even the educated and professional in the community carried off the palm in prowess as well as in frequency of indulgence. The close of last, and beginning of the present century saw a gradual change set in for the better. But even in my young days, when I began to go into company, about 1820, drunkenness in good society was far from uncommon. Almost any party of gentlemen, left in the dining-room, according to the fashion of the day, by the ladies, would rejoin them in the drawing-room with two, three or more much flustered, or drop one or two in the lobby incapable of showing face upstairs. But a rapid reform took place, and for a long time past any sign of alcoholic excitement in the drawing-room after dinner would lead to remark, and displeasure, and to quiet measures for withdrawing the offender. Cases of gross intoxication do occur certainly. But these are cases of the passion of drinking, "oinomania," or, in plain English, insane "drunkenism." There is thus a vast improvement in the habits of good society in Scotland, in the use of stimulants, during the last fifty years.

But I grieve to say that there is far from a similar improvement in the working classes. I am certain that proportionally drunken-

ness is more frequent there than it was. I cannot give you statistical proof. I would not give a rush for any such proof that may be offered me on one side or the other. But I can give you the result of my observation on the street and country roads. For, when I was a young man, and indeed till about thirty years ago, it was a very rare thing to meet a working man, either in town or country, who was drunk until the evening, after his work for the day was over; but for some time past such cases may be seen frequently at all hours of the day, and especially between one and two o'clock, which is their interval of work for dinner. I first observed this curious change, and mentioned my observation to various friends at the time who confirmed it, when about twenty-five or thirty years ago a great reduction was made in the excise duty on spirits. Within a few years the very high duty was restored, indeed was made greater than ever in Scotland; but there has been no improvement effected thereby in the appearance of things in our streets. Great exertions have been made by the educated classes to cure this fearful malady; and I must not say anything to undervalue their exertions in establishing temperance societies, and total-abstaining clubs. But I doubt whether many drunkards have thus been permanently reformed, and of the many guiltless who join these associations in youth, it may be a question whether any material number would have fallen victims to the vice if unprotected by the pledge, simply because a preponderating mass of the population have no natural tendency to fall in this way.

You also ask "what amount of crime is produced by the abuse of stimulating liquors?" When I was professor of medical jurisprudence for ten years, and for ten years more during which I kept up my connection with criminal trials as a crown referee and witness, I had ample occasion to verify the statement made by our procurators-fiscal, sheriffs, and public prosecutors,—that three-fourths of crimes against the person are more or less connected with drunkenness, and very many owing to that cause alone.

Lastly, you ask "what are the effects of the abuse of alcoholics on the health and prosperity of the people?" Here however two questions are embraced in one. I shall answer only that which relates to the health of the community. But if the vice of drunkenness damages the health of the people, and accounts for even only one-half of the cases of crime against the person, I imagine it will be unnecessary to answer the second branch of your third question,— "what is the effect of the abuse of alcoholics on the prosperity of the people?"

The influence of the vice of drunkenness on the health was

brought very early under my notice, in consequence of my being for very many years, and from a very early age; a medical officer of our infirmary, at a time when various epidemics prevailed; and, as professor of materia medica, I have had time to methodize my views on this subject as a branch of the action of alcoholics, in relation both to diet, and to medicines proper. Thus, in the first place, I recognize certain diseases which originate in the vice of drunkenness alone, which are delirium tremens, cirrhosis of the liver, many cases of Bright's disease of the kidneys, and dipsomania or insane drunkenism. Then I recognize many other diseases in regard to which excess in alcoholics acts as a powerful predisposing cause, such as gout, gravel, aneurism, paralysis, apoplexy, epilepsy, cystitis, premature incontinence of urine, erysipelas, spreading cellular inflammation, tendency of wounds and sores to gangrene. Next, I recognize as a wide-spread result of habitual excess, an inability of the constitution to resist the attack of diseases at large. And lastly, I recognize a greater inability, than in the sober, to sustain the treatment which is necessary or most serviceable in diseases generally. If all these ways of influencing mortality be taken into account, it is evident that the sum total must be very great indeed, although it may be impossible to express it numerically. How can we ever hope to express numerically the influence of drunkenness in aggravating the mortality from fevers, cholera, dysentery, and other zymotics? How much more difficult, when the question is with apoplexy and the long catalogue of other diseases of which the vice is the predisposing cause? No hospital physician, however, of long experience can doubt for a moment the enormous effect of habits of drunkenness in increasing one way and another hospital mortality,—that is, the mortality of the working classes. Details on this head would lead me to write a book, in place of a letter. But let me conclude with one illustrative fact. I have had a fearful amount of experience of continued fever in our infirmary during many an epidemic, and in all my experience I have only once known an intemperate man of forty or upwards recover. He was the *exceptio quæ firmat regulam*.

I will gladly learn what you think of all this. But remember I am not one of those who would deprive the world of alcoholics, for the sake of those who abuse them; I am not one of those smug philanthropists, who would ask a government "to permit me to prevent you from having your grog." If a man, in face of universally admitted consequences, will insist on habitually getting drunk,—*quid facias illi? Jubeas miserum esse, libenter quatenus id facit.*

I am yours most faithfully,

D. R. CHRISTISON.

UNITED STATES CONSULATE, ROTTERDAM, }
Nov. 9th, 1870. }

SIR:—I have the honor to transmit to you the enclosed documents which I have just received after so long a delay. In forwarding them to me, the secretary of the society* explained that delay by stating that my letter was only received after the preceding trimestrial meeting, and that it had to be referred to the following meeting.

The within statement is an extract of the letter which accompanied the pamphlet.

I shall always be very happy to do anything for which you may have an opportunity of applying to this Consulate.

Very respectfully yours,

(Signed) FREDERICK SCHÜTZ, *U. S. Consul.*

In this country gin is the beverage of the people, and to such an extent as to create a general anxiety about the future of a nation committing excesses in that beverage, condemned as well for moral as physical and economical reasons.

The minister of finances estimated the revenue on gin for 1871 at 14,200,000 florins, gin paying 53 florins duty per hectolitre of fifty degrees strength. The quantity used for technical or other purposes is hardly anything.

Calculating the population of the Netherlands at three and a half millions, and taking off three-fourths for women, children and very old people, show that one-fourth of the whole population furnishes a tax of more than 14 millions of guilders, and undoubtedly the same amount to inn-keepers, etc.

It is calculated that twenty-eight-thirtieths millions of florins are spent in gin by the people.

We believe that every drop of alcohol is injurious and the beginning of wilful poisoning, as it is incessantly proclaimed by our renowned oculist, Professor Donders; and that this kind of alcohol, obtained by distilling, does not mix itself with the blood, but runs through all blood vessels, acting injuriously on the brain and impairing the best human faculties down to second and third generations.

The investigations of the society have led to the result that the number of drinkers of gin has considerably decreased, that the use of that beverage by higher and middle classes is considered indecent, and that the people are coming to the conviction that, in

* Société Néerlandaise pour l'abolition des boissons fortes.

the interest of peace and public order, intoxicating liquors must be abolished.

By statistics it is shown that fifteen-sixteenths of the crimes committed result from the use of gin.

HIOJO, JAPAN, Oct. 17th, 1870.

DEAR SIR:—Your letter of the 23d of February was handed not long since by Mr. Stewart, the American Consul, with the request that I should answer it.

The chief intoxicating drinks used in Japan are a simple fermented liquor from rice, called Saki, and a distilled liquor called Shochin.

In the island of Kinsin, wine is made from grapes.

There is a great deal of saki consumed in Japan; but probably less drunkenness seen on the streets, at least, than in America; and whether there is really less drunkenness it is hard to say. The opinion of the best informed men is, that most of the drinking is done at home, and hence not noticed by casual observers, but that there is more drinking to excess here than at home.

With reference to the amount of crime traceable to the use of intoxicating liquors, there are no statistics at my disposal, and the observation of the most favored foreigners has been so limited that any opinion would be of no value. I have written to the authorities on the subject, but have as yet received no answer; if one arrives with any information on the subject, I shall be most happy to forward it to you.

Yours, very respectfully,

D. C. GREENE.

CONCORD, MASS., Dec. 17th, 1870.

DEAR SIR:—I have just received through Mr. Brewer, your circular of February 10, an answer to which, I fear, I shall not be able to make very satisfactory from the imperfect data I have at hand. Had I been consulted in season, I would have advised the addressing your circular either to Attorney-General Stephen H. Phillips, or to Dr. G. P. Judd of Honolulu, or to some other resident physician. Mr. Phillips is now on a visit to his friends in Salem, Mass.

The amount of crime caused by the use of alcoholic drinks can only be determined by the records of police courts, of which I have no reports.

The answer to your first question, "what are the chief intoxicating articles used in the Sandwich Islands?" may be found in the Honolulu custom-house returns, from which I copy as follows:—

Invoice Values.

	1867.	1868.	1869.
Importation of English "ale and porter" and German "beer," chiefly lager beer,	\$38,526 18	\$38,073 70	\$20,246 16
Importation of "spirits" (consisting of American whiskey, French brandies, Holland gin and West India rum),	23,288 70	35,907 24	33,870 98
Importation of "wines" (mostly French and German, with a small proportion of California), . .	8,451 87	12,030 60	15,801 46

Spirits taken out of Bond for consumption in 1869.

Rum, 896 gals.	Port, 201 gals.
Gin, 5,239 "	Bitters, 177 "
Brandy, 4,537 "	Sundries, 328 "
Whiskey, 4,177 "	
Alcohol, 799 "	17,016 gals.
Sherry, 1,162 "	

Estimated revenue from duties on spirits and wines for two years, 1870-1 and 1871-2, \$85,000.*

The distillation of spirits in the Hawaiian Islands is prohibited by law. Illicit distillation, however, has been carried on to a considerable extent; and the government has never been able to entirely suppress it. The amount of the domestic article is insignificant when compared with the amount imported. It is the product of a native root called "Ti" root which is rich in saccharine matter. The traffic in "Ava," also a native root, is legalized, used chiefly by natives, as a medicine ostensibly, but really for no other than intoxicating purposes. With its narcotic stimulant properties and its action on the skin, you are doubtless familiar.

* *Vide* Ministerial Report.—Duty on spirits, \$2.50 per gallon. Duty on wines, 50 cents per gallon.

The traffic in opium is legalized, and its consumption, though chiefly confined to the Chinese, is beginning to find favor with the native population. A Chinese merchant paid, about two years since \$9,000 for the exclusive right of the trade in opium in the Hawaiian Islands.

Besides the product of the "Ti" root (a spirit of about the strength of American whiskey), the natives prepare a stimulating beverage by the fermentation of sweet potatoes and of molasses when they can obtain it; not openly, however, as this also is unlawful.

The native population of the islands is about 55,000.

White foreign population does not exceed 4,000.

Chinese population about 2,000.

Of the foreign white population, not more than one-half are addicted to the use of intoxicating drinks. Very little, if any, is taken by the Chinese. And as the sale of all intoxicating beverages to natives is prohibited by law, enforced with severe penalties, the consumption by this class of the population is comparatively trifling.

The amount of alcoholic drinks imported into the Hawaiian Islands appears large when compared with the whole number of consumers, probably not exceeding two or at most three thousand. But by far the largest consumption is, no doubt, to be placed to the account of the great number of seamen annually visiting the different ports of the islands.

Your circular calls for the "relative amount of intoxication" (at the Sandwich Islands) and "that seen in the United States." But having resided abroad for thirty years past I have had but little opportunity of observation as it respects the relative or actual consumption of spirits in this country. And I have therefore given the total amount of the consumption at the Sandwich Islands with the number of consumers as nearly as can be ascertained, leaving the comparison with the United States to be made by those better informed than myself. As I am in doubt also as to the limitations (if any) under which the word "intoxication" is to be taken in the circular, I have preferred giving the *facts*, leaving the *effects* to be inferred.

In regard to the "effects" however "of alcoholic beverages upon the health and prosperity of the people" of the Hawaiian Islands, instead of my own "opinion" I am able to give you what will have far more weight—the views of the Hawaiian government—which may be inferred by its course of legislation in respect to alcoholic beverages during a period of fifty years. The importation of in-

toxicating beverages into the Hawaiian Islands, except for medicinal use, was some years subsequently to the arrival of the American missionaries, 1820, absolutely prohibited, and this prohibition continued in force till 1839, when (in July of that year) it is well known that the king of the Sandwich Islands, in order to avert the threatened bombardment of his capital by the French frigate "Artimise," signed a treaty, urged at the cannon's mouth by Capt. La Place, admitting French brandies ("eaux-de-vie") at a duty not exceeding five per cent. Subsequently other nations in treaty with the Sandwich Islands claimed the same privilege by the "parity clause." For several years subsequent to the visit of the "Artimise," the French consul and other interested persons, made strenuous efforts, though without success, to induce the Hawaiian Legislature to repeal the law prohibiting the sale of intoxicating drinks to natives. The French consul insisted that the law contravened the spirit of the treaty, but this pretension was finally abandoned.

In contrast with the treatment of the Hawaiian Islands by the French, we are reminded of the very different policy they found it necessary to adopt for the government of Tahaite, of which they took possession in 1839. Very soon after its occupation by the French, intoxicating beverages were classed with the contrabands, and the prohibition has been continued to the present time.

With more time, I might have made my answer more full and direct to the points of your circular, but Mr. Brewer informed me that you desired a reply without delay.

Very truly yours,

R. W. WOOD.

UTRECHT, December 22, 1870.

DEAR SIR:—The honorable Mr. J. J. Van Osteyee asked the favor of me to answer your favor of February 23, and so I have the honor to inform you, that the principal strong drinks which are consumed in the Netherlands are, Genevee, which is made out of corn, and used principally by the poorer classes, whilst the wealthier folks drink punch and different strong liquors.

We have in the Netherlands for the last twenty-five years a society, which does not work strictly for temperance, whose limits are difficult to define, but whose aim is to abolish the consumption of strong drinks, which, owing to the misery they produce, can be called a canker which destroys the prosperity of the people. Spread out over different sections of the country, the society, which counts

already several thousand members and increases always more and more, endeavors to persuade the people with the help of tracts and public meetings, what awful consequences arise from the abuse of these drinks, and although it has done a great deal of good in that direction, the members of the society giving good example by words and deeds, it waits always for severe measures on the part of the government.

Concerning your second question with regard to the consequences which these hurtful drinks exercise upon the health and prosperity of the people, the best answer will be the statement of our two most renowned medical professors, which was accompanied by the signatures of more than six hundred physicians throughout the Netherlands, of whom twenty-two live in our city, the contents of which statement is as follows :—

The undersigned physicians will sustain as much as possible the members of the *Nederlandish Society* for abolition of the consumption of strong drinks in their efforts in this behalf, and will work to remove the wide-spread prejudice as to the usefulness of the moderate use of strong drinks, and in consequence consider it their duty to give the following explanations as to the influence of strong drinks on the human body :

1. The moderate use of strong drinks is always unhealthy, even when the body is in healthy condition ; it does not do any good to the digestion, but even interferes with that process, for strong drinks can only temporarily increase the feeling of hunger, but not in favor of digestion, after which strong reaction must follow, and evils which are usually attributed to other causes, but often result from the habitual use with moderate drinkers.

2. The assertions, that intoxicating drinks used moderately, are naturally innocent means of cheering up, that they are useful in severe colds, or that they are with laboring men equivalents for sufficient nourishment, or useful in misty and humid air, or for people obliged to work in the water, or a protection against contagious diseases, are without any foundation, and contradictory experience and to human reason, and the habitual use of the same has therefore an unhealthy effect, and an influence unlike what people expect from them.

3. The habitual use of strong drinks works most perniciously on all diseases and especially on consumption.

4. Regarded as the usual drink of all classes, they are not only improper on account of the above reasons, but also against moral development and material prosperity in such measure, as to be considered and to be stamped as the greatest underminers of the actual welfare of mankind.

(Signed)

C. B. TILAMUS,

P. U. SWINGAR,

Professors.

AMSTERDAM, March 19, 1846

In spite of this concise explanation, which was printed and distributed among the people and of all the efforts which the society uses, to work against the abuse in the consumption of strong drinks, the number of those, who are the slaves of this evil and subject to the consequences arising from the same, is still very great.

It can be said according to a source based on an eighteen years' experience, that the number of misdeeds committed under the influence of intoxication amounts to more than seventy-five to eighty per cent. I should be glad if these lines were satisfactory to your philanthropic intentions.

The delay in answering your favor is due to the lack of time in consequence of the same being taken up by my profession, I being principal teacher (superintendent) of the public schools.

Hoping that you will excuse the delay, I wish that you may work for our principles in your industrial country on the other side of the Atlantic, and that you may be able to contribute something towards the abolition of the mischievous drinking, in order that your fellow-citizens may become temperate, economical and industrious members of your republic, striving for perfection.

I have the honor to be with high esteem, very respectfully yours,

J. VISSCHER, *Chairman for the Department of Utrecht,
of the Nederlandish Society for the Abolition of Strong Drinks.*

BOSTON, January 29, 1871.

DEAR SIR:—The chief intoxicating articles used in Panama and Darien are annisette, cocoa-nut milk, wine from the wine-palm, a drink made from bananas and plantains, and a milky-looking liquid made only by the Sassardi-Morti Indians at Darien.

The annisette is brought wholly from Cartagena or Santa Marta, and is not made by the Indians. A little over a thimbleful will intoxicate any person not used to it, and none can bear more than an ordinary sized wine-glass full. It is nearly colorless, though slightly tinged with violet. It is said to be very injurious in its effects, few constitutions being able to bear constant use of it but a few years, or in some cases, months.

Cocoa-nut milk is made by covering half ripe nuts with a few inches of sand on the seashore, just above high tide, and leaving them for about six weeks. In this length of time the milk ferments and becomes as thick as cream, and next to annisette (or the European drink, agvadente), is the most intoxicating drink used by the natives. As it will not keep, the Indians as a general rule have their stock of buried cocoa-nuts, which they use as they want.

The wine made from the wine-palm is produced by squeezing the fruit in a press similar to the sorghum presses used in the West. The Indians make considerable quantities of it, and use it extensively in their households. It is only a moderate kind of stimulant, I believe, and seemingly not injurious when used moderately.

The drink made from bananas and plantains is quite similar to the cocoa-nut milk, though not nearly so powerful in its effects. There does not seem to be a great quantity of it used, from the fact I suppose of the cocoa-nut milk being easier to manufacture; but the Indians appear to drink it with great relish whenever they can obtain it.

The milky-looking liquid is manufactured by the Sassardi-Morti Indians principally; it may be by the others also, but Sassardi is the only place where I have ever seen it. Its composition is wholly unknown to me, but I imagine it has several component parts. It is not very strong, and is said by those who have tasted it to be a very pleasant acid drink, little stronger, if any, than cider.

The amount of crime produced by the use of the aforesaid drinks is a thing impossible to ascertain, but I judge not nearly so much as with white people under the same circumstances.

The relative amount of intoxication in Panama and Darien (among the Indians) is much less than has been commonly believed. Of course there are certain ones among them that are drunkards, but as a general rule, they are a much more temperate set than the whites. One circumstance was noticeable everywhere,—the less the civilization, the less the intoxication. At San Blas (Carti), where the Indians are far more advanced in civilization than at Caledonia Bay, or the Atrato, the amount of intoxication was fully two hundred per cent. more. But even there the number of drunken Indians in the little community was far less, I should judge, than it is in correspondingly large towns in the United States.

Respectfully yours,

E. W. BOWDITCH,

Late Mineralogist Darien Expedition of 1870.

MORTALITY OF THE CITY OF BOSTON

I n 1870.

MORTALITY OF THE CITY OF BOSTON IN 1870.

The mortality of a great city like Boston is usually expressed by a death-rate applied to the whole population. Sometimes the death-rate can be given by wards, but such divisions of territory are unsatisfactory for sanitary comparison. A portion of a ward may be good and another portion obviously bad in this respect. Ward six illustrates the difference. One side of Beacon Hill is made up of the very best, and the other side of the very worst houses ; yet both are included in the same ward lines. It is desirable to be able to compare the death-rate in certain sections of Boston which are marked by various distinctions which may be supposed to influence the duration of life. With this view the city has been divided into twenty-four *Health Districts*, which are represented on the accompanying map. They are numbered from twenty to forty-three to avoid all chance of their being confounded with wards.

The "new land," or land reclaimed from the sea by filling with earth, is represented on the map by a dark gray tint. It will be seen that it includes already as much territory as was comprised in the peninsula of old Boston. The process of "filling," commenced in the last century, is still going on.

A word of caution may be given with regard to the fair interpretation to be put on results thus reached. Every one will of course see that there are many considerations relating to the general circumstances of the inhabitants to be weighed before a judgment can be formed as to the salubrity of "made land." The new land of Rochester and Genesee Streets is not necessarily chargeable with the high death-rate of that section, for it is quite equalled by the death-rate of the original land of the North End. Neither must the new land of the Back Bay be

credited with the low death-rate of that region, since the original land of the Highlands (District 41) is equally exempt from mortality. Another consideration, less obvious, is equally important to remember. There are large sections in which the number of servants nearly equals the number of persons of all ages in the families employing them. These domestics do not have their own children with them, and in case of severe illness, preceding death, they very often go to other places.

District No. 20 is East Boston.

District No. 21 is ward two, or the North End east of Haverhill and Blackstone Streets. A large part is made up of warehouses. Streets narrow. Inhabitants chiefly Irish.

District No. 22 is the portion of ward three, east of Poplar Street. It includes the streets on either side of Leverett Street, and a portion of the old "mill pond."

District No. 23 is a district of which the Massachusetts Hospital is the centre, and includes the north side of Beacon Hill. It contains a large proportion of all the colored inhabitants of the city.

District No. 24 is that portion of ward four, enclosed by Hanover, Court and Green Streets. Portland Street runs through the middle of this district. It includes most of the old "mill pond."

District No. 25 takes the rest of ward four.

District No. 26 is ward five.

District No. 27 is the south side of Beacon Hill, from Revere Street to the Common, and from the State House to Charles Street. It also includes a small territory on the north side of Beacon Hill, on either side of Hancock Street. It is nearly all original soil. The inhabitants are almost exclusively American.

District No. 28 is all "made land." It extends from Commonwealth Avenue to Charles River, and also includes the territory between Charles Street and the river, down as far as Cambridge Bridge. Inhabitants almost exclusively American.

District No. 29 is the portion of ward seven on the Old-Boston side of the channel. It is all "South Cove" land, reclaimed from the sea. Inhabitants chiefly Irish and German.

District No. 30 is the northern half of South Boston. A very large proportion of the inhabitants are Irish.

District No. 31 is ward eight. Its centre is about the cor

ner of Hollis and Washington Streets. It includes a portion of "South Cove" made land. A mixed population of Americans, Irish, Germans, and a good many Jews.

District No. 32 is that part of ward nine which lies west of Berkeley Street and Columbus Avenue. It is all made land, and is occupied almost exclusively by Americans.

District No. 33 is the "Church Street District." Many Jews live in this region. It is nearly all "made land."

District No. 34 is the "Suffolk Street District." Nearly all "made land."

District No. 35 is ward ten, west of Dover Street. More than half is "made land."

District No. 36 is ward eleven, east of Northampton Street.

District No. 37 takes the rest of ward eleven, and the portion of ward fourteen north and east of Washington Street. It includes the sunken Ruggles Street territory which the health authorities of Boston have suffered to be covered with expensive houses in 1870.

District No. 38 is the southern half of South Boston, including Washington Village, and (together with No. 39) the low, marshy region on the borders of the South Bay, referred to in the "Report on Flats and Water Areas," presented to the last Legislature.

District No. 39 is ward thirteen. Like the preceding district a large portion is so low as to make drainage difficult if not impossible. It is being occupied, however, by tenement and other houses, in violation of the law relating to "wet and spongy lands."

District No. 40 is ward fourteen, south and west of Washington Street, and including Mount Pleasant.

District No. 41 is Roxbury Highlands, or the portion of ward fifteen, south of Washington Street.

District No. 42 is the portion of ward fifteen, north of Washington Street. It includes the upper part of Tremont Street, the breweries, bone-boiling establishments, and what is known as "Grab Village." A mixed population of Irish, Germans and Americans.

District No. 43 is Dorchester, extending south to Neponset River, and including territory of great extent, but (as compared with old Boston) sparsely peopled.

The deaths and their causes in each of these districts have been obtained through the kindness of Mr. Apollonio, the City Registrar, by whom they are always recorded with great fidelity. He has allowed the State Board of Health every opportunity to examine the returns.

The population of the Districts has been obtained from the enumerators engaged in making the census of 1870. Application was made to the United States authorities at Washington, for permission to employ these officers in noting on the margin of their returns the facts we required. This was freely given, and by the kind co-operation of Gen. Andrews, U. S. Marshal, we have been enabled to obtain such information as was needed to carry out the original design.

The facts thus collected have been arranged in such manner as to show the comparative prevalence of each of the most prominent causes of death in all parts of Boston.

The following tables, by which this result is reached, have been prepared, since the close of the year to which they refer, by Dr. Frank W. Draper of Boston.

Analysis of the Mortality of Boston in 1870; showing the number of deaths from various causes, and at various ages, in each of Twenty-Four Districts.

HEALTH DISTRICT.	SCARLATINA.				MEASLES.				SMALLPOX.				CROUP AND DIPHTEHRIA.				TYPHOID FEVER.			
	Under 1 year.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.
20,	5	26	14	45	1	-	-	1	-	-	2	2	2	13	4	19	-	3	21	24
21,	3	8	-	11	3	14	1	18	-	-	2	2	3	8	2	13	-	3	18	21
22,	1	3	1	5	-	-	-	-	-	-	3	3	-	2	-	2	-	-	8	8
23,	-	1	3	4	-	2	1	3	-	-	2	2	1	2	-	3	-	-	8	8
24,	-	1	-	1	1	-	-	1	-	-	1	1	-	2	-	2	-	-	3	3
25,	-	1	1	2	-	-	1	1	-	-	1	1	-	-	-	-	-	-	2	2
26,	-	3	-	3	-	2	1	3	-	-	1	1	1	6	-	7	-	2	11	13
27,	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	3	3
28,	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
29,	1	4	1	6	1	2	1	4	-	-	-	-	-	3	-	3	-	1	3	4
30,	5	13	9	27	4	8	2	14	-	-	3	3	5	18	3	21	-	1	10	11

Analysis of the Mortality of Boston—Continued.

HEALTH DISTRICT.	DIARRHŒA AND DYSENTERY.				CHOLERA INFANTUM.				CONSUMPTION.				TUBERCULAR MENINGITIS.			
	Under 1.	1 to 4, in-clusive.	5 and over.	Total.	Under 1.	1 to 4, in-clusive.	5 and over.	Total.	Under 1.	1 to 4, in-clusive.	5 and over.	Total.	Under 1.	1 to 4, in-clusive.	5 and over.	Total.
20,	11	6	6	23	30	5	-	35	3	2	66	71	3	2	-	5
21,	13	9	7	29	55	19	-	74	2	5	97	104	1	2	-	3
22,	3	1	5	9	11	4	-	15	1	-	51	52	-	-	-	-
23,	7	1	9	17	15	5	-	20	1	-	51	52	2	2	-	4
24,	5	-	2	7	17	1	-	18	2	2	15	19	-	1	-	1
25,	-	-	4	4	2	-	-	2	-	-	4	4	-	-	-	-
26,	3	5	2	10	13	6	-	19	2	1	54	57	1	1	-	2
27,	-	-	2	2	1	-	-	1	-	-	9	9	1	-	-	1
28,	-	-	-	-	1	-	-	1	-	-	4	4	-	-	-	-
29,	8	2	3	13	23	7	-	30	2	2	41	45	-	-	-	-
30,	19	4	9	32	75	22	-	97	2	5	140	147	4	4	1	9
31,	2	-	7	9	10	2	-	12	-	1	40	41	-	-	-	-

32,	.	.	.	1	2	-	8	3	-	3	-	15	26	847	888	19	21	1	41
33,	.	.	.	1	-	-	1	1	1	2	-	-	1	15	16	-	-	-	-
34,	.	.	.	4	2	1	7	16	4	20	-	-	2	21	23	-	1	-	1
35,	.	.	.	1	2	3	6	14	1	15	-	-	1	39	40	1	-	-	1
36,	.	.	.	1	1	2	4	3	-	3	-	-	-	21	21	-	1	-	1
37,	.	.	.	3	3	2	8	16	6	22	-	-	2	38	40	2	1	-	3
38,	.	.	.	1	-	2	3	18	2	20	-	-	-	14	14	-	1	-	1
39,	.	.	.	5	-	5	10	18	8	26	-	-	-	29	29	-	-	-	-
40,	.	.	.	-	-	1	1	10	7	17	-	-	-	15	15	1	1	-	2
41,	.	.	.	1	1	-	2	6	2	8	-	-	-	8	8	-	-	-	-
42,	.	.	.	9	6	4	19	20	10	30	-	-	1	42	43	3	4	-	7
43,	.	.	.	1	1	4	6	26	5	31	-	-	-	24	24	-	-	-	-
Grand Total,	.	.	.	99	46	80	225	404	117	521	-	15	26	847	888	19	21	1	41

Analysis of the Mortality of Boston—Concluded.

HEALTH DISTRICT	MARASMUS.				PNEUMONIA.				ALL OTHER CAUSES.				AGGREGATE.			
	Under 1.	1 to 4, in-clusive.	5 and over.	Total.	Under 1.	1 to 4, in-clusive.	5 and over.	Total.	Under 1.	1 to 4, in-clusive.	5 and over.	Total.	Under 1.	1 to 4, in-clusive.	5 and over.	Total.
20, . . .	15	1	—	16	10	5	20	35	58	27	122	202	133	90	255	478
21, . . .	23	12	4	39	7	17	25	49	95	45	227	367	205	142	383	730
22, . . .	4	4	2	10	7	7	14	28	30	14	58	102	57	35	142	234
23, . . .	9	1	—	10	2	1	16	19	22	10	111	143	59	25	201	285
24, . . .	4	1	1	6	2	2	5	9	22	10	53	85	53	20	80	153
25, . . .	1	—	1	2	3	1	1	5	3	2	41	46	9	4	56	69
26, . . .	1	—	—	1	7	4	19	30	28	18	119	165	56	48	207	311
27, . . .	1	—	—	1	—	—	6	6	4	2	31	37	8	2	51	61
28, . . .	—	—	—	—	—	—	1	1	2	—	5	7	3	—	11	14
29, . . .	4	2	—	6	7	3	17	27	35	15	74	124	81	41	140	262
30, . . .	16	10	1	27	12	20	29	61	118	52	211	381	260	152	418	830
31, . . .	1	2	1	4	2	3	7	12	24	6	96	126	40	18	162	220

Ratio of Mortality, showing the Number of Deaths from various Diseases to One Thousand of Population.

HEALTH DISTRICT.	POPULATION, JUNE, 1870.				SCARLATINA.				MEASLES.				SMALLPOX.			
	Under 1 Year.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.
20, .	664	2,270	22,582	25,516	7.5	11.5	.6	1.7	1.5	-	-	.08	-	-	.1	.1
21, .	720	2,610	21,589	24,919	4.2	3.	-	.4	4.2	5.3	.1	.7	-	-	.1	.1
22, .	264	743	8,568	9,575	3.8	4.	.1	.5	-	-	-	-	-	-	.4	.3
23, .	164	753	9,981	10,898	-	1.3	.3	.4	-	2.6	.1	.3	-	-	.2	.2
24, .	109	386	5,225	5,720	-	2.6	-	.2	9.1	-	-	.2	-	-	.2	.2
25, .	22	88	4,387	4,497	-	11.4	.2	.5	-	-	.2	.2	-	-	.2	.2
26, .	256	890	12,940	14,086	-	3.3	-	.2	-	2.2	.2	.2	-	-	.2	.1
27, .	33	154	3,710	3,897	-	-	-	-	-	-	-	-	-	-	-	-
28, .	30	126	2,279	2,435	-	-	-	-	-	-	-	-	-	-	-	-
29, .	816	957	8,315	9,588	3.2	4.2	.1	.6	3.2	2.1	.1	.4	-	-	-	-
30, .	1,007	3,310	23,439	32,756	4.9	3.9	.3	.8	3.9	2.4	.1	.4	-	-	.1	.1
31, .	139	599	10,490	11,278	-	1.7	.1	.2	5.3	-	-	.1	-	-	.4	.2

Ratio of Mortality—Continued.

HEALTH DISTRICT.	CROUP AND DIPHTHERIA.				DIARRHEA AND DYSENTERY.				CHOLERA INFANTUM.				CONSUMPTION.			
	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.	Under 1.	1 to 4, inclusive.	5 and over.	Total.
20, . . .	8.	5.7	2	.8	16.6	2.2	.8	.9	45.2	2.2	-	1.5	4.5	.9	2.9	2.8
21, . . .	4.2	8.	.1	.5	18.1	8.4	.8	1.2	76.4	7.8	-	2.9	2.8	1.9	4.5	4.2
22, . . .	-	2.7	-	.6	11.4	1.3	.7	.9	41.8	5.4	-	1.5	3.8	-	5.9	5.3
23, . . .	6.	2.6	-	.3	42.7	1.8	.9	1.6	91.5	6.8	-	1.8	6.	-	5.1	4.8
24, . . .	-	5.6	-	.4	45.9	-	.4	1.6	156.	2.6	-	3.1	18.3	5.6	2.9	3.
25, . . .	-	-	-	-	-	-	.9	.9	90.9	-	-	.4	-	-	.9	.9
26, . . .	3.9	6.7	-	.5	11.8	5.6	.8	.7	50.8	6.7	-	1.8	7.8	1.1	4.3	4.1
27, . . .	30.3	-	-	.3	-	-	.5	.5	30.3	-	-	.3	-	-	2.4	2.3
28, . . .	-	-	-	-	-	-	-	-	33.3	-	-	.4	-	-	1.8	1.6
29, . . .	-	3.1	-	.3	25.3	2.1	.4	1.5	72.4	7.8	-	3.1	6.4	2.1	4.9	4.7
30, . . .	4.9	3.9	.1	.7	18.8	1.2	.3	1.	74.5	6.6	-	2.9	1.3	1.5	4.9	4.4
31, . . .	-	3.3	-	.2	10.6	-	.7	.8	52.9	3.3	-	1.1	-	1.7	3.3	3.6

32, . . .
33, . . .
34, . . .
35, . . .
36, . . .
37, . . .
38, . . .
39, . . .
40, . . .
41, . . .
42, . . .
43, . . .

1871.]

PUBLIC DOCUMENT—No. 37.

	-	4.7	-	.3	-	-	-	-	-	18.8	9.8	-	.8	56.6	-	-	.8	2.5	2.4	2.5
	-	6.2	-	.6	-	-	1.2	1.1	12.	12.	-	-	.2	12.	3.1	-	.4	3.5	3.6	3.5
	-	1.9	-	.4	-	-	.5	.6	23.7	3.7	.1	.6	.6	94.7	7.5	-	2.5	2.9	2.9	2.9
	4.8	6.	-	.6	-	-	.7	.6	48	3.	.8	.5	.5	66.9	1.5	-	1.4	3.9	3.9	3.7
	-	2.7	-	.1	-	-	.4	.4	11.6	2.7	.8	.5	.5	34.9	-	-	.4	2.8	2.8	2.7
	-	6.8	-	.8	-	-	.5	.5	10.2	2.8	.2	.7	.7	54.8	5.8	-	1.9	3.6	3.6	3.4
	-	12.4	-	1.2	-	-	.2	.2	7.7	-	.3	.4	.4	139.5	4.1	-	3.1	2.5	2.5	2.2
	.9	7.5	-	1.2	-	-	.7	.6	19.7	-	.7	1.2	1.2	70.9	8.5	-	3.	3.9	3.9	3.4
	-	-	-	-	-	-	.5	.6	-	-	.2	.2	.2	76.9	14.6	-	2.7	2.6	2.6	2.4
	-	-	-	-	-	-	.2	.1	6.2	1.5	-	.3	.3	37.	2.9	-	1.2	1.4	1.4	1.2
	-	3.2	-	.4	-	-	1.5	1.2	29.9	6.5	.6	2.8	2.8	66.6	10.7	-	3.7	6.1	6.1	5.4
	-	5.8	-	.6	-	-	.7	.7	3.2	1.1	.4	.4	.4	84.1	5.3	-	2.6	2.2	2.2	1.9
Grand Total, .	2.5	4.3	.1	.6	-	.6	.6	.6	16.6	2.3	.8	1.	1.	67.9	5.7	-	2.1	3.8	3.8	3.5

Ratio of Mortality—Concluded.

HEALTH DISTRICT.	TUBERCULAR MENINGITIS.				MARASMUS.				PNEUMONIA.				ALL OTHER CAUSES.				AGGREGATE.			
	Under 1.	1 to 4, in-clusive.	5 and over.	Total.	Under 1.	1 to 4, in-clusive.	5 and over.	Total.	Under 1.	1 to 4, in-clusive.	5 and over.	Total.	Under 1.	1 to 4, in-clusive.	5 and over.	Total.	Under 1.	1 to 4, in-clusive.	5 and over.	Total.
20, . . .	4.5	.9	-	.2	22.6	.4	-	.6	15.1	2.2	.9	1.8	79.8	11.9	5.4	7.9	200.3	39.6	11.3	18.7
1, . . .	1.4	.8	-	.1	31.9	4.6	.2	1.6	9.7	6.5	1.1	1.9	131.9	17.5	10.4	14.8	284.8	54.4	17.6	29.2
22, . . .	-	-	-	-	15.1	5.4	.3	1.	26.5	9.4	1.6	2.9	113.6	13.7	6.7	10.6	216.	46.9	16.7	24.4
23, . . .	12.2	2.6	-	.3	54.9	1.3	-	.9	12.2	1.3	1.6	1.7	134.1	13.4	11.1	13.1	359.6	33.2	20.1	26.1
24, . . .	-	1.3	-	.2	36.7	2.6	.2	1.	18.3	5.6	.9	1.5	201.8	25.9	10.1	14.8	486.1	51.8	15.2	26.7
25, . . .	-	-	-	-	45.5	-	.2	.4	136.4	11.4	.2	1.1	136.4	22.7	9.5	10.2	409.2	45.5	12.7	15.2
26, . . .	3.9	1.1	-	.1	8.9	-	-	.1	27.3	4.5	1.5	.2.1	109.4	20.5	9.2	11.7	218.7	53.9	16.7	22
27, . . .	30.3	-	-	.3	30.3	-	-	.2	-	-	1.6	1.5	121.2	12.9	8.3	9.4	242.4	12.9	13.7	15.6
28, . . .	-	-	-	-	-	-	-	-	-	-	.4	.4	66.6	-	2.2	2.8	100.	-	4.8	5.7
29, . . .	-	-	-	-	12.8	2.1	-	.6	22.4	8.1	2.	2.8	110.7	15.6	8.9	12.9	256.5	42.8	16.8	27.8
30, . . .	8.9	1.2	.04	.3	15.8	3.0	.04	.8	11.9	6.	1.	1.9	117.2	15.6	7.4	11.6	258.	45.6	14.6	25.8
31, . . .	-	-	-	-	5.3	3.3	.1	.3	10.6	5.	.7	1.1	126.9	10.	9.2	11.1	211.6	30.2	15.4	19.5

32, . . .	-	-	-	-	-	-	-	-	-	4.7	.3	.5	94.3	9.3	2.9	4.8	169.7	37.4	5.9	9.8
33, . . .	-	-	-	-	-	-	-	-	12.1	6.2	1.7	2.1	144.7	21.6	8.2	11.5	192.8	40.2	15.1	20.1
34, . . .	-	1.9	-	-	.1	28.7	1.9	-	28.7	8.7	8	1.5	41.5	11.3	6.3	7.4	219.	41.3	11.3	17.7
35, . . .	4.8	-	-	.1	.1	4.8	3.	-	23.9	1.5	1.3	1.7	110.	18.1	7.6	10.4	224.9	45.2	14.1	20.1
36, . . .	-	2.7	-	.1	.1	11.6	2.7	.1	-	8.1	1.1	1.4	151.2	8.1	5.6	7.2	220.9	37.8	10.6	14.2
37, . . .	6.8	.9	-	.3	-	13.2	.9	-	20.4	5.8	.9	1.8	102.	10.7	6.8	9.1	210.2	38.6	12.4	19.4
38, . . .	-	2.	-	.2	-	46.5	8.1	-	54.2	8.1	.5	2.1	131.9	22.3	11.4	14.7	379.8	57.	15.5	26.
39, . . .	-	-	-	-	-	3.9	1.1	-	19.7	4.3	1.5	2.3	118.1	11.7	7.5	11.3	244.	44.8	15.1	25.3
40, . . .	7.6	2.1	-	.3	-	7.6	-	.2	7.6	4.2	.4	.7	123.1	14.6	7.7	10.7	223.1	41.7	12.2	18.8
41, . . .	-	-	-	-	-	-	-	-	6.2	1.5	.8	1.	30.9	4.5	3.9	4.5	86.2	10.3	6.2	9.1
42, . . .	9.9	4.3	-	.9	-	6.8	6.4	.2	26.5	8.4	1.9	3.5	122.9	18.1	10.1	15.1	289.	77.7	21.4	37.9
43, . . .	-	-	-	-	-	3.2	-	.1	-	1.1	.5	.5	77.5	8.5	7.2	9.	171.2	23.4	11.4	16.3
Grand Total, .	3.2	1.	-	.2	-	16.6	2.4	.1	16.6	4.8	1.1	1.4	110.2	14.1	7.9	10.9	243.9	43.6	14.2	22.1

NOTE.—In the foregoing tables all deaths in the city of Boston during 1870, are included, except those of still-born children, and deaths occurring at Deer Island, Carney Hospital, the Saint Anne Infant Asylum, and the Consumptives' Home in Willard Street. The deaths at the Massachusetts General Hospital and the City Hospital are transferred to the Districts in which the patients lived previous to their admission. 486 deaths are thus omitted from the tables because they could not fairly be assigned to the Districts in which the above-named public institutions happen to be situated. Adding this number to the 5,553 above accounted for, the total mortality of Boston becomes 6,039, and the death-rate 24.10 in a thousand.

An examination of the tables brings to light many interesting facts which have not before been attainable.

The first gives in numerical form the condensed material obtained from the death records. The second gives the total population of each District, and the number of children under one and between one and five years of age living in each.

Then comes the list of those diseases whose comparative prevalence in a series of years determines the death-rate of all communities in Massachusetts. The list is seen to include those which have the strongest claims to be regarded as preventable diseases.

By tracing along the columns one may see how destructive each disease was in each District, and what proportion of a thousand died from it among the infants, among the young children, and among the adults. Thus, for instance, in the very populous northern half of South Boston (No. 30), we see that among 1,007 infants 4.9 in 1,000 died from scarlet fever, while in the region east of the Providence Railroad crossing, in what was lately Roxbury (No. 42), among 301 infants the deaths from the same cause were at the rate of 26.4 in 1,000.

Croup and diphtheria are in the same way discovered to have been more prevalent in Districts 38 and 39, while three Districts have had no deaths from this cause.

Typhoid is found to have been most prevalent in Districts 42, 33, 22, 20, 26 and 21; dysentery and diarrhoea in 42. Cholera infantum is seen to have killed very nearly 68 in a thousand of all the nursing children in the city, and this in such enormously disproportionate numbers in the various Districts as may surprise those who do not already know the influence which overcrowding and filth have upon this disease. As the cholera infantum column should be studied chiefly in the age under one year, so the next in the list, consumption, should be judged by the ages over five. The greatest mortality is seen to be in Districts 42, 22, 23, 29 and 30, and the least mortality in Districts 25, 41 and 28.

Marasmus is the somewhat indefinite disease assigned in the case of a certain number of children in whom a gradual wasting of flesh and strength has preceded death. Districts 23, 38, 25, 24 and 21 show very plainly that this mortality among infants is associated with a dense population. Pneumonia, a disease of

all ages, but especially fatal at the extremes of life, shows a greater uniformity in its distribution through the districts than any other of the list.

Coming now to the aggregate mortality from all causes we find that in District 24 nearly half of all the infants died within the year. This is to be accounted for in part by the large number received at an establishment in Portland Street, where wet nurses are always to be obtained.

In District 25 the ratio is also very large, but it will be seen that the whole number is small.

In Districts 38 and 23 more than one-third of the whole number of infants died; in Districts 42, 21, 29 and 30 more than one-quarter, and in Districts 39, 27, 40, 26, 22, 31, 36, 34 and 20 more than one-fifth. On the other hand in District 41 the mortality among infants was less than one-tenth.

Looking now at the general death-rates for all ages we see a very great disparity in the several Districts, ranging from 5.7 (District 28), 9.1 (District 41), and 9.8 (District 32), up to the enormous rate of 37.9 in a thousand in District 42. This latter region is low, imperfectly drained, in parts densely peopled and full of nuisances which have been allowed to grow and fester unchecked by the city authorities. Stony Brook between Tremont Street and the Providence Railroad, and also in the neighborhood of Parker Street, has been a source of disease to all the dwellers in its vicinity. The stench from this neighborhood has been often perceptible during the past summer at the distance of a mile. District 42 is also in the immediate neighborhood and under the influence of the sunken tract about Ruggles Street, in District 37, on which water has been standing continually during the past hot summer. Fortunately the tract in question is hardly peopled as yet, although covered with new houses which must be raised, like Church and Suffolk Streets, at a vast expense, most of which might have been saved if the health authorities of the city had done their duty. District 21 is next most fatal to life. It is very densely peopled and contains the worst tenement houses in Boston. District 29, with its crowded and narrow streets leading from Harrison Avenue to the South Bay, comes next in order; 38, 24, 23, 30, 39 and 22 follow not far behind in their ratios of death to population.

The death-rates of East Boston and the North End present a

contrast which is worthy of examination. These Districts are of nearly equal population and the numbers at all ages very nearly correspond, yet the mortality in one is half as great again as in the other. One is crowded, in great part, deprived of sunlight, and full of nuisances; the other has abundance of light and air. Can a stronger argument be offered in favor of providing breathing spaces for the people than is presented by the figures in the first two horizontal lines of our second table, from one end to the other?

The very limited time which is given us between the completion of this tabular analysis at the close of the year, and the presentation of our Report to the legislature, must prevent more extended comment on the many instructive facts which it makes apparent.

TH DISTRICTS

OF THE

THE CITY OF BOSTON

arranged by

STATE BOARD OF HEALTH.

show the mortality in

1870.

THE VENTILATION OF SCHOOL-HOUSES.

BY A. C. MARTIN, ARCHITECT,

OF BOSTON.

THE VENTILATION OF SCHOOL-HOUSES.

The importance of thoroughly ventilating school-houses is acknowledged by everybody, while the number of persons who have considered the amount of ventilation required to keep a room in a wholesome condition, and the best way to produce the necessary change of air is comparatively small.

All know that the condition of the air in most school-rooms an hour after the session has commenced is very bad, so bad as to induce a morbid condition of the system, impairing the mental vigor of both teachers and scholars.

The cause of the trouble is commonly stated to be the presence of carbonic acid in the air which we exhale. When first thrown off from the lungs, it is warmer than the surrounding air and therefore rises to the upper part of the room; consequently, in the popular idea, the bad air is always at the top of the room. According to the same theory it is only necessary to make a hole somewhere in or near the ceiling to let it off, and thus the room is properly ventilated. This theory of ventilation, it should be noticed, makes no provision whatever for a supply of fresh air in those school-rooms (no small proportion of the whole number), which are warmed by stoves. In cases where furnaces are used, they are commonly regarded as sources merely of heat; seldom as the means of a supply of *fresh air*. Registers are placed somewhere in the floor, but their size and disposition are left to convenience or to the discretion of the furnace dealer, whose sole aim is to furnish *heat*, not air. True, some air must make its way through the hot-air pipes, but as soon as the temperature of the room is so high as to be too warm for comfort, the register is closed, thus shutting off entirely any supply of fresh air except what may creep in through the crevices around the doors and windows. If further relief from heat or close air becomes necessary, the windows are let

down a little from the top. The result of this is that the cold air rushes in and fills the bottom of the room, causing dangerous draughts for those who sit near the windows, and cold feet for everybody.

If we examine this popular notion concerning the theory and practice of ventilation, we shall find its explanation of the cause of the difficulty falls as far short of stating the whole case, as the remedy proposed fails to accomplish the desired end.

As we have seen, the carbonic acid gas exhaled from the lungs is looked upon as the principal evil. Its presence is, indeed, clearly recognized and the amount given off by the lungs has been determined to be about four per cent. of the air exhaled.*

But so far from its being the principal evil in vitiated air, it is proved by experiment that a still larger proportion of carbonic acid than is contained in the close air of an unventilated room, may be mixed mechanically with ordinary air, and breathed without inconvenience. The workmen engaged in the manufacture of soda-water do not experience any ill effects from breathing large quantities of it.

We must, then, seek further for sufficient causes for the foul condition of the air in an occupied room. We shall discover in it not only this deleterious acid, but in still greater proportion the watery vapor and the animal matter thrown off by both lungs and skin. The amount of watery vapor given off by the lungs and skin has been variously estimated as from twenty to forty ounces in the twenty-four hours, or about six to twelve grains (troy) per minute. This vapor contains animal matter which seems to putrefy almost immediately after being thrown into the air. It is the source of the vile odor in an ill-ventilated room, and, in its effects on the health, is far more dangerous than carbonic acid gas, which is now generally considered as acting rather as an obstructor of respiration than as a positive poison. No surer or more exact test than a well-educated nose has, as yet, been discovered to measure the amount of vitiating animal matter thus thrown into the air, but of its sources we can form some inferences.

* The difference in quantity is caused by varying circumstances. The amount thrown off is least during the night and greatest during the day. It would seem that the maximum and minimum amounts depend upon the state of digestion or the degree of physical exertion.

The immediate emanations of the body itself we have just mentioned. All clothing, carpets and furniture are adding constantly to the air the minute particles worn off by friction. A beam of sunlight thrown across the best-kept room marks its way on the dust in the air, and we all remember what we have seen floating in the air of school-rooms. Still another element of evil must be counted in the clothing of children of the poorer classes, which is worn and kept in homes that have never known an airing. It is easy to detect, in some school-rooms, the odors resulting from the different occupations of the children's parents, mingled with the scent from the frying of the family doughnuts or the smoke of the paternal tobacco-pipe. What science hints of the germs of disease in the air about us, might startle the most careless, but such details are unnecessary when we are discussing ventilation, not for cases where great crowds of people are assembled, or where unusual causes create foul air, as in the sick-wards of a hospital, but in relation to the far simpler question how we can best ventilate and warm our school-rooms.

One general consideration remains to be added to this brief statement of the elements of evil in foul air. The air we breathe is exhausted of its life-giving power after a few inhalations. Deprived of its normal proportion of oxygen, it is thus rendered unfit for its proper uses. Again, the carbonic acid, the watery vapor, the animal matter and the minute dust are soon diffused throughout the room. The question where the air is worst may be taken up later, but it must be manifest from what has been said that the entire air of a close room soon becomes vitiated in every part. Still further,—we are considering rooms in which the children daily spend five or six hours, the teachers, often seven or eight. The children are at an age when respiration is most active and when nature demands an ample supply of air of the purest quality.

We are, then, forced to conclude from the nature of the evil and from the imperative necessity of its entire removal, that no remedy can be successful, which does not ensure a full and complete renewal of the air in the room as often as it becomes foul or dead. Nothing less than an absolute change of the whole volume of air can accomplish the object.

How often this should be done within a given time must de-

pend upon the size of the room and the number and age of the persons occupying it. Authorities differ as to the amount of air to be supplied to insure a proper ventilation, but it is generally admitted that it should be not less than ten cubic feet per minute for each person. It may be that children require as much as adults, as they breathe faster. The actual amount of air-space in the room must also be carefully considered.

The Royal Commissioners appointed by the British government to inquire into the sanitary condition of barracks and hospitals, reported in 1857 that the capacity of the rooms should be not less than six hundred (600) cubic feet of air-space for each soldier, and the supply of air, per minute and per man, not less than twenty cubic feet. Messrs. Fairbairn, Glaisher and Wheatstone reported about the same time to the general bureau of health that the supply should be from fifteen to twenty cubic feet per minute for each individual. Gen. Morin, the director of the "Conservatoire des Arts et Metiers," gives the amount at from twenty to thirty cubic feet. These estimates, it will be observed, are for adults, and, in the case of the soldiers, for sleeping-rooms occupied from eight to nine hours consecutively. For children and school-rooms, the amount of air required varies, according to Gen. Morin, from seven to eighteen cubic feet per minute, in proportion to age; and the air-space from two to three hundred feet.

As an illustration, we will take an ordinary grammar school-room for fifty-six scholars. Such rooms in Boston are twenty-eight feet wide, thirty-two feet long and twelve feet high; containing 10,752 cubic feet, or 192 cubic feet to each scholar. If we assume ten cubic feet per minute as the minimum supply for each scholar, it will require 560 cubic feet of fresh air per minute for the school-room; or 33,600 cubic feet per hour. This supply would renew the whole volume of air in the room three times in an hour. If we assume fifteen cubic feet per minute for each scholar, it will require for the whole school 840 cubic feet per minute and 50,400 per hour, thus demanding the renewal of the whole volume of the air a little more than four and a half times per hour. The second estimate would prove, in practice, the proper one in the school-room designated, which is not large enough for so many occupants. It should contain at least 220 cubic feet of air-space for each individual.

We have now to consider the means of obtaining this indispensable fresh air. If the mere supply of warm air would ventilate an occupied room, we should have had the question of ventilation, for the cold season at least, settled thoroughly during the reign of hot-air furnaces. For the twenty years preceding the last decade, most school-houses put up in the cities contained neither grates or fire-places, for the furnace was considered the best means of heating and ventilating rooms, and even now some dealers specially advertise their wares as *ventilating furnaces*.

It is obvious that no means of supplying air can accomplish ventilation which does not also provide for the removal of the old and foul air. Any person accustomed to an open fire in a room partially heated by a furnace feels at once the difference in the quality of the air on going into the room of his neighbor who depends solely upon the hot-air register. The open chimney in the one case is constantly drawing off the bad air. In the other it escapes slowly, if at all, through crevices or by the occasional opening of the door. It not unfrequently happens that the hot air ceases to enter through the register for the want of an outlet, and the door must be opened in order to start it.

Our object, then, should be to seek such means of renewal and supply as shall cause and maintain a perfect balance between the in-coming and the out-going air. The old-fashioned fireplace is the first suggestion of the idea. The popular practice we have before mentioned was supposed to be an advance of improvement. It makes a hole near the ceiling to let out the bad air, opens the furnace registers, and considers the work done. On this principle no proper diffusion of fresh air could be obtained. A steady current would soon be established between the register and the ventilator, leaving dead air eddying up and down in the lower part of the room, which may be breathed over and over again before it is drawn into the main current and taken out of the room. Where a running stream passes by a cove of comparatively still water, a counter-current is almost always seen setting up along the shore.

When the air from the register is heated in the winter the difficulty is increased, as the current is accelerated and cold air remains nearly undisturbed, or settles down disagreeably upon the head and shoulders. A person sitting in a church near one

of the large hot-air registers will not unfrequently be annoyed by very perceptible counter-currents of cold air which set downwards beside the ascending hot stream.

To avoid these difficulties and secure the proper *diffusion* of the air are the main questions in all discussions of the subject. The systems proposed seem to have divided themselves into two great classes by taking up the subject at its two opposite ends, one looking to the out-going of the air, the other to its in-coming, though both have as a common aim the perfect balance of the two.

One system concerns itself only with supplying the air, leaving it to make its way out through ducts provided for the purpose. It accomplishes this by blowers or fans which press the air into the room. It is the *plenum* method, and may be farther characterized as the mechanical. It is expensive and requires great and constant care in working, while its success is sometimes doubtful. For these reasons it need not farther be considered for school-house ventilation.

The other system is directed to the withdrawal of the foul air, and this may be accomplished by means of natural laws requiring no machinery other than simple ducts. It is the *vacuum* method. It avails itself of the natural tendency of warm air to rise, which is the result of the law of the dilatation of gases.

“A volume of air heated from the freezing point to the boiling point of water (Barometer at 30 in.), expands .375 or about $\frac{3}{8}$ of its volume, or .002 for each degree Fahr.”—(*Guy Lussac's law.*)

If the temperature of the air in a school-room is 20° higher than that of the exterior air its volume has been increased $.002 \times 20 = .04$ or $\frac{1}{25}$; consequently it is lighter than the exterior air and tends to rise. If a vertical duct or shaft, leading directly upward and out of the building, be connected with such a room a current of air will at once set up through it (subject to the conditions hereafter stated), unless it happens that the shaft or duct be cooled down to the exterior temperature by contact with the outer air. If necessary, heat can be applied to the lower end of the shaft, or the smoke-pipe from the furnace may be carried up through the duct, to increase its draught.

The necessary supply of an equal amount of fresh air will be

drawn into the room, either through the hot-air pipes of the furnace or some special ducts prepared for the purpose, or, failing these, it will work its way in about the doors and windows.

It will be readily understood from what we have before said that the mere hap-hazard arrangement of the register in the floor and the hole in the ceiling will not answer. Good ventilation consists in the proper distribution of the ducts for the outgoing and in-coming air, and in their proper relation and correspondence with each other, so as to secure the perfect removal of the bad air and the thorough diffusion of the new.

The power of a vertical duct to draw the air from a room results from the velocity of the flow of air through it. This velocity depends,—

First, Upon the difference between the external and internal temperature.

Second, Upon the height of the duct.

Third, Upon the resistance or friction; that is to say, upon the straightness and smoothness of the duct.

Fourth, Upon the sufficiency of the supply of air to replace that which is drawn from the room.

The amount of air evacuated by such a duct in a given time depends on the same four conditions, and also upon the area of a cross-section of a duct, that is, upon its size. The following general equations express these relations; in which,—

V is the mean velocity of the air in the duct.

K is a numerical co-efficient dependant upon the form, disposition and friction of the duct, and is constant for each duct.

T is interior temperature.

T' is exterior temperature.

H is height of the duct.

A is the area of a cross-section of the duct.

Q is the volume of air passing in one second.

$$1. V = K \sqrt{(T - T') H}.$$

$$2. Q = KA \sqrt{(T - T') H}.$$

By an inspection of the above equations it will be seen that to increase the velocity of the flow of the air through a vertical duct, and consequently the drawing power of the duct, and also the amount of air evacuated in a given time, we must either in-

crease its height or the excess of the interior temperature above the exterior. By the interior temperature is meant that of the air in the duct, and this is practically the same as that of the room, unless additional heat is applied to the duct.

From the above principles it follows that when the height and disposition of the vertical ducts have been determined by the character of the building, their size should be estimated for summer ventilation when there is the least difference of temperature; and also that the ducts for the upper parts of a building should be made larger than those for the rooms below, if they are required to evacuate the same amount of air. The same reasoning applies to the hot-air pipes. They should be larger in area or cross-section for the rooms below than for those above, because they are shorter and consequently the velocity of the air would be less than in the longer pipes for the rooms above.

The question next arises as to the way of adapting the means to the end. Shall the vertical ducts lead out from the top or the bottom of the room? Shall the fresh air be taken in at the floor or at the ceiling? Which will work to best advantage, an upward or a downward movement in the air of the room?

It might seem at first a matter of small consequence where the air is taken out, since it is safe to say it would soon become bad in every part of a room, but the importance of the point will appear as we proceed.

At first sight it would seem easier to ventilate a room by the general upward movement of the air, because its tendency, when first exhaled from the lungs, is to rise.

A cubic foot of air at 60° Fahr., dew point 40° (Bar. 30 inches), will weigh 534.27 grs. A cubic foot of expired air at 95°, dew point 85°, containing 12.78 grs. of vapor and say four per cent. of carbonic acid, will weigh only 494.12 grs., or seven and one-half per cent. less.

This tendency is further increased by the heat given out from the body, which warms the air in immediate contact with it, so as to cause upward motion enough to be measured by the anemometer.

Nevertheless this upward movement, even when aided by the flow of hot air from the furnace fails to secure a proper diffusion of the fresh air. We have shown, in discussing the claims of furnaces as ventilators, how quickly a steady current will be

formed between the inlet and the outlet, leaving the bad air almost or quite unmoved, and only slowly and partially drawn into the current. If the attempt be made to diffuse the air by taking it in at several different places, it is apt to cause disagreeable draughts of warm air upon persons near the registers. Another objection will be found in the difficulty of heating a room ventilated in this way, because the hot air is drawn off too rapidly, while the great mass of cold air remains at the bottom of the room, thus making a marked difference of temperature between the air at the floor of the room and that at the level of the head, amounting often to six or seven degrees.

If, on the other hand, we connect the duct withdrawing the air with the lower part of the room, we shall have, in the first place, an advantage as obvious as it is important, in the removal of the foul air as nearly as possible at its source. By that law of the diffusion of gases, by which æriform bodies diffuse themselves through each other's masses to an unlimited extent, the carbonic acid in expired air would undoubtedly be diffused throughout the whole room. The aqueous vapor, loaded with animal matter, must also contaminate the whole atmosphere, so that, although after a full school-room has been shut up an hour, it would be hard to say where the air in it is worst, it is plain that the evil can be reached at its source, and should be removed at once before it spreads through the whole apartment. By using the downward movement the dust also (no small part of the trouble), will be drawn off immediately and not scattered everywhere. The emanations from skin and clothing are got rid of far sooner, and the clean and tidy children will not suffer so much from their less tidy neighbors. The good accomplished by the open fire-place is precisely on this principle of taking the air out of the bottom of the room. The whole subject may be well illustrated by the case of a reservoir or pond where some special cause of defilement exists at one end. If, instead of drawing or pumping out the foul water as nearly at the spot as possible, an engineer should undertake to draw it off through the clean water, allowing it to diffuse itself all the way, what folly it would seem.

The foul air should be taken out by openings so distributed around the bottom of the room that the currents of withdrawal shall affect all parts of it, while the fresh air should be introduced at the top. If it comes in at a temperature lower than

that of the room, it should be distributed as much as possible, and directed upward and along the ceiling, so as not to fall directly down upon the heads of those below.

If the air be heated and drawn in by a constant current, it will diffuse itself under the whole ceiling, and, arranging itself in layers, the warmest at the top, will gradually settle down through the room. The diffusion would be nearly or quite perfect, but for the unequal cooling of the air by contact with the outer walls. This inequality would be perceptible, however, only in extreme cases, and the heating of the room would be accomplished without draughts of any sort. For by taking the air out from the bottom of the room at a number of places, the velocity of the current of withdrawal through the registers can be easily made so small as not to be perceived; a current of air of the same temperature as the rest of the room is not unpleasant unless quite rapid, while a current of a higher or a lower temperature is disagreeable, though its velocity be no greater than the former.

So far we have considered the question in its simplest form, viz.: a vertical duct leading directly from the room into the open air. This would be impracticable in a large building, but the principle can be applied with equal success to any number or arrangement of rooms. The ducts should be made to connect with the bottom of a central shaft or chimney, of size and height sufficient to create a strong drawing power in all of them. The smoke-pipe of the furnace passing up through the chimney would aid the draught, or a fire can be built in a grate prepared for the purpose near the bottom. In this way, every part of a large school-house, rooms, halls, water-closets, can be effectually ventilated.

This method has a strong claim to favor from the facility with which the air of a room may be heated to a certain given point. To maintain an even temperature when the heat from the lungs and body is constantly thrown into the room, is one of the chief difficulties in the problem of good ventilation. The success attainable by the use of the downward movement has been repeatedly demonstrated in Europe, where it has been adopted for many years. It is clearly shown in the résumé of one of the most interesting of Gen. Morin's experiments. His object was to heat and ventilate the two amphitheatres or

lecture-rooms of the Conservatoire des Arts et Metiers at Paris, and his success is the more remarkable on account of the special difficulties of adapting ducts to the walls and rooms of an old building. On this account it was necessary to place the ventilating shaft or chimney in the court yard, at a distance from the two rooms. The ducts, which led from many openings around the bottom of both rooms, were connected with the bottom of the chimney where a grate was placed in which a fire was lighted while the rooms were in use, in order to quicken the draught. Both rooms were warmed by furnaces, the heat being taken in at many points around the top of the room. Cold-air flues were so arranged in connection with the hot-air pipes that the hot and cold air might be varied in quantity by opening and shutting valves, and thus the fresh air might be let into the room at just the right temperature. Gen. Morin gives a series of observations on the working of this system from December 16th, to January 9th. The small hall, which will seat 360 persons, held during this time an audience varying from 35 to 360 persons. In the large hall, seating 700, it varied from 278 to 680. Two sessions a day were held and the observations extended through twenty-eight sessions. The temperature out of doors ranged from 32° to 46° Fahr. In the small hall the mean temperature was 68° . The highest at any time was 72° , and this was reached but three times. The lowest, occurring but once, was 64.40° . In the large hall, the mean temperature was $67\frac{1}{2}^{\circ}$. The highest was 72° , the lowest 64° , neither of which extremes was reached more than once.

Remarkable as this uniformity from day to day appears, the equality of temperatures at the top and bottom of the room is still more worthy of note. Though the audience was trebled in one room and increased tenfold in the other, the thermometers at the floor and at the ceiling never differed more than $3\frac{1}{2}^{\circ}$ Fahr.

It might be supposed that results so successful were attained only by the employment of attendants of great skill and experience. On the contrary, the furnace and ventilating apparatus were managed by the regular porter whom Gen. Morin describes as of the ordinary intelligence and faithfulness of his class. He adds: "After a very few days, the attendant became so familiar with the management of the apparatus that whatever the number of the audience or the exterior temperature,

he succeeded in limiting the range of the interior temperature between 65° and 70° Fahr."

Many large buildings are warmed with air heated by passing over two or three coils of steam-pipe. In such cases too great heat could easily be avoided by the use of valves to shut off the steam from one or more of the coils of pipe, leaving the fresh air to flow unchecked. This plan avoids entirely the fault of shutting the register in a school-room, thus excluding the fresh air as well as the heat.

If the common furnace is used, great care should be taken to manage the fire so as not to throw the dangerous gases from hard coal into the air-chamber, whence they will inevitably be carried into every room. The valve in the smoke-pipe often causes much harm in this way, when it is used to check the draught; the draught itself should not be checked too soon or too much, lest the coal be burned without giving out its proper amount of heat, and the poisonous carbonic oxide be evolved from it. Mistaken economy is often the unsuspected cause of the trouble from gas in houses and school-rooms.

Can we plead too strongly for a thoughtful consideration of this subject? Fresh air is not a luxury, not even an essential comfort, but an absolute necessity for the children. The duty of providing it is imperative. The cost is to be counted a trifle in proportion to the good to be gained. We build our walls tight and strong to keep out the cold, and then complain that we must pay money for fresh air, the most bountiful gift of nature. Let the school-houses at least be planned and built, in the first instance, with free channels for the air to come and go, then the item of ventilation will make small show in the construction accounts. When the blessing of ventilation is fully understood, the most grumbling of tax-payers will admit that money spent for it was never better invested. Then shall it no longer be said that teaching is more wearing than any other profession requiring the same actual labor, but teachers and scholars shall work without over-fatigue or listlessness in their fresh, sweet school-rooms.

EXPLANATION OF WOOD-CUTS.

Nos. 1 and 2 show the plan and section of a small country school-house for fifty-six scholars. The room is heated by a stove, surrounded by an envelope. This casing will prevent the

direct radiation of the heat which makes the seats near by so uncomfortably warm. But its main purpose is to aid in heating the fresh air which comes in by a duct (marked A) made under the floor, with an opening beneath the stove. It is precisely similar to the "cold-air box" of a furnace, and should be made large and have a valve for regulating the supply of fresh air. The cold air from out of doors is thus warmed by the stove and rises up within the envelope to the top of the room, where it is diffused along the ceiling and thence is drawn down by the action of the ventilating ducts. Of these there are four horizontal ones, shown by the dotted lines. They may be made between the floor timbers, and should be as smooth as possible, with the angles rounded where a change of direction is necessary. Each of them has four inlets (shown by the pairs of curved arrows), making for the room sixteen outlets for foul air. These openings into the ducts should be protected by a raised hood placed under the seat with a wire guard over it (see figure 7). Moreover the ducts should have partitions under each opening (see figure 8), to insure a flow of air through each of them. These ducts are all connected with the vertical shaft at B. The smoke-pipe from the stove is carried up through its whole height so that the heat radiated from it may be utilized in rarefying the air in the shaft, in order to help the draught.

The sizes of foul air registers, ducts and shaft, are calculated as follows:—

There are fifty-six scholars, each requiring fifteen cubic feet of air per minute, which makes for the whole room, 840 cubic feet, or fourteen cubic feet per second. For ventilation in early fall or late spring, when it is too warm for fires and too cold for open windows, we can obtain a velocity of three and a half feet per second in the shaft by the aid of a small stove placed in the bottom of it. Therefore the shaft must have a cross-section of four square feet, in order at that velocity to draw off the required fourteen cubic feet per second. Each horizontal duct must pass one-quarter of fourteen cubic feet per second, or three and a half cubic feet, with a velocity of about two and a half feet per second. A cross-section must then be one and one-fourth square feet, or twelve by fifteen inches. Each foul-air register will be required to pass one-fourth of three and a half cubic feet per second with a velocity of two feet. Its area must then be .4375 square feet,

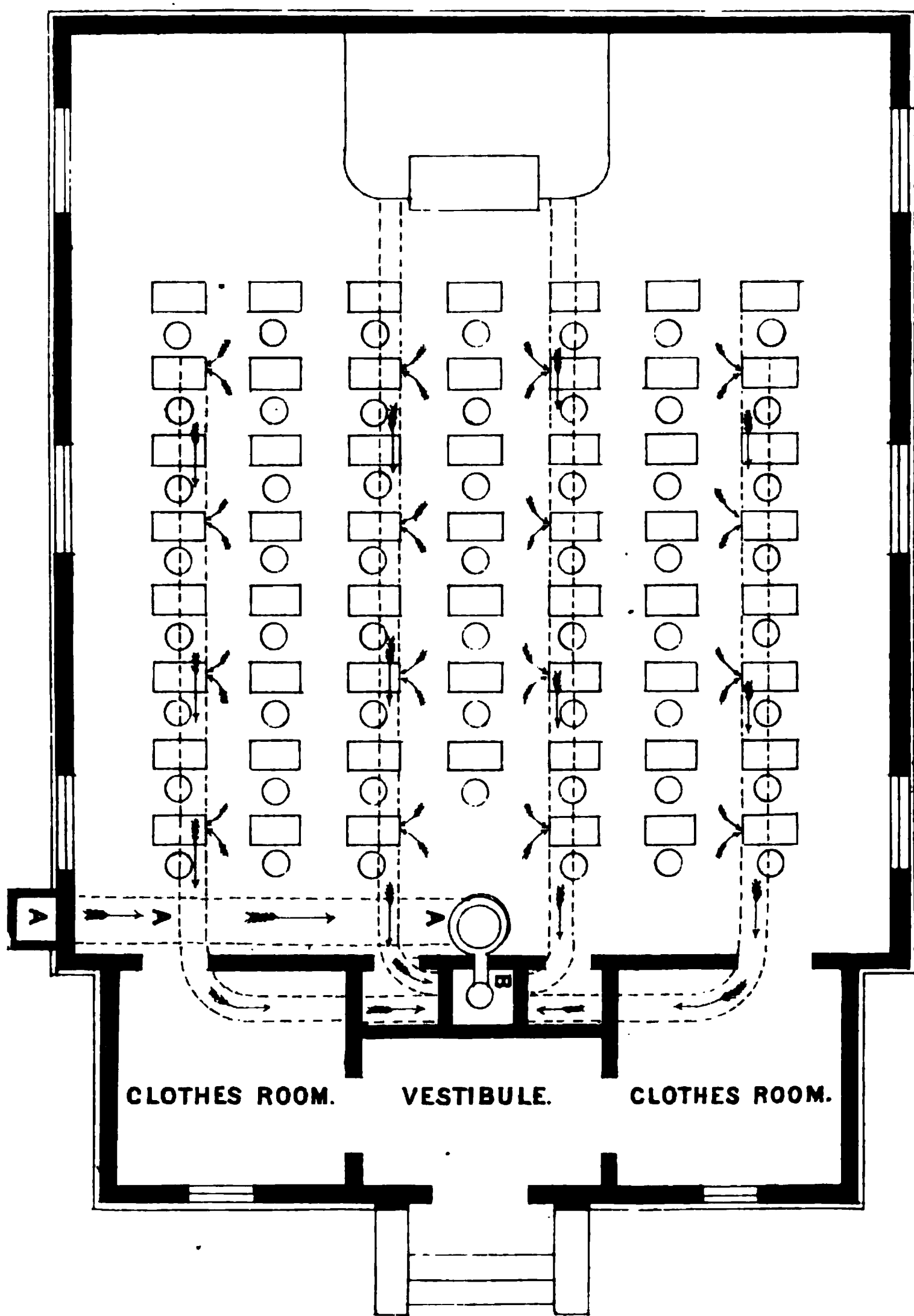
equal to sixty-three square inches or eight by eight inches. The outflow of air can be increased or diminished by the use of a valve in the shaft by which its withdrawing power can be controlled. In case more fresh air is required than that supplied through the envelope of the stove, when the valve in the fresh-air duct is wide open, openings (C) are made through the ceiling into the attic in which is a window (D) which can be raised and lowered by means of a cord below. The drawing power of the ventilating shaft will at once determine an influx of cold air which should be directed and diffused along the ceiling. Should a furnace be used to heat such a room, the ducts for withdrawing the air should be precisely the same as in the plan. The hot-air flues should be carried up to the ceiling with passages for cold air beside them in order to temper the heat if desired. See figure 6. The valve can be held by the cord in any position required, so as to admit all cold or all hot air or any proportion necessary. (The figure shows the cold air entirely cut off.) The power of the current in the vertical shaft will secure the upward flow of the cold air.

Figures 3, 4 and 5 represent the basement and first and second stories of an eight-room school-house. In such a building there is generally a large hall in the third story which prevents carrying the vertical ducts up through the roof; therefore it is more convenient to carry the foul air down into the basement by ducts connected with a ventilating chimney (see Gen. Morin's experiments, above), which should be large enough to ventilate the whole building, including the large hall. Fig. 3, shows the secondary collecting ducts under the basement floor, and their connection with the bottom of the chimney.

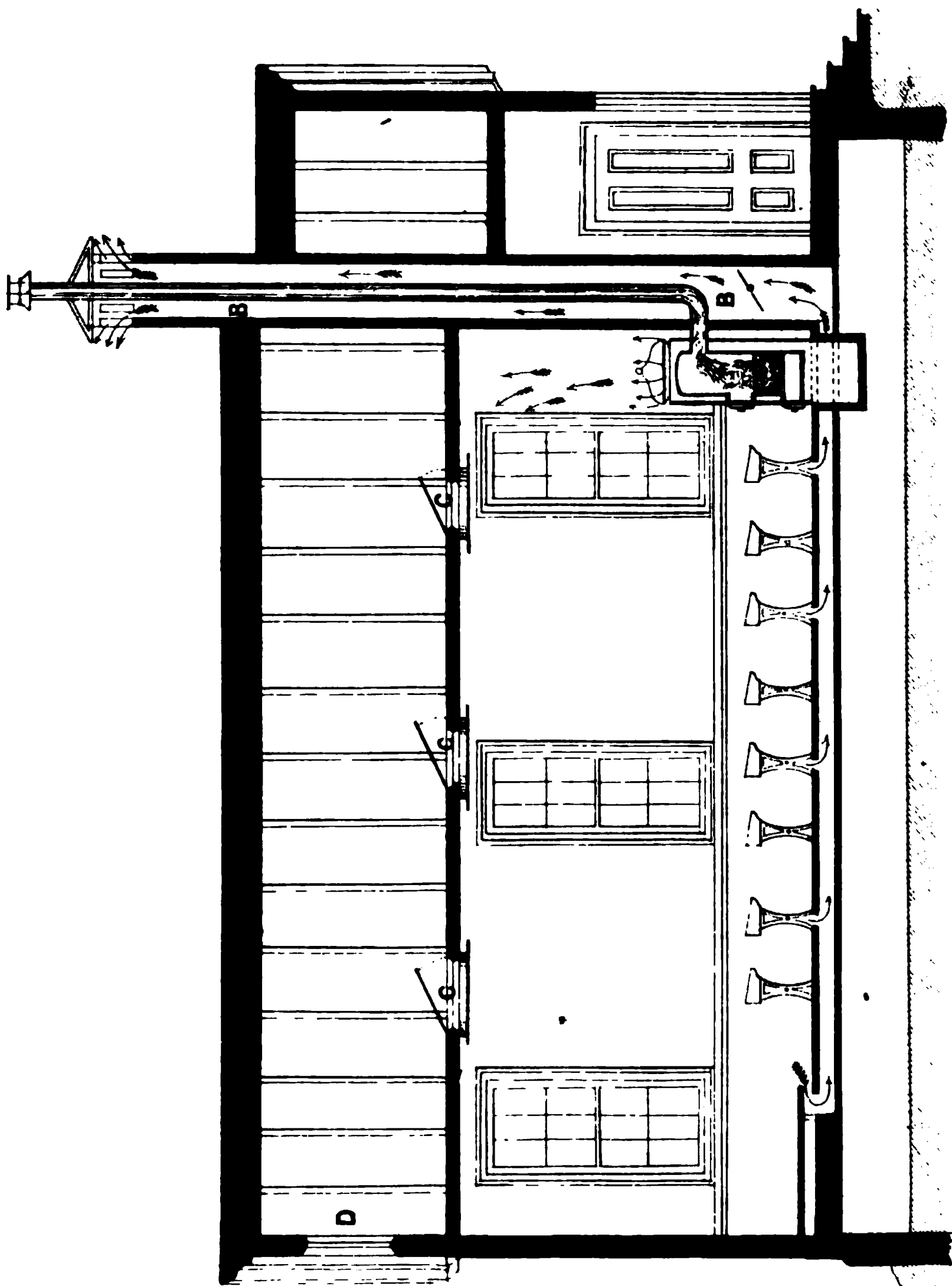
The calculations for this case are precisely like those for one room. The minimum velocity of the flow of air in the chimney should be about six feet per second. It may be increased by steam coils or a fire in the bottom to nine, or, in cold weather, even twelve feet per second.

In room M, Fig. 4, the horizontal ducts are shown with the foul-air registers. Room N shows the distribution of the fresh air through a hollow cornice made for the purpose. Room O shows the position of the desks.

Fig. 5. is a section taken on the line X—Y of the plan, and shows the primary and secondary collecting ducts and the main shaft.



PLAN FIG. I.



LONGITUDINAL SECTION. FIG 2.

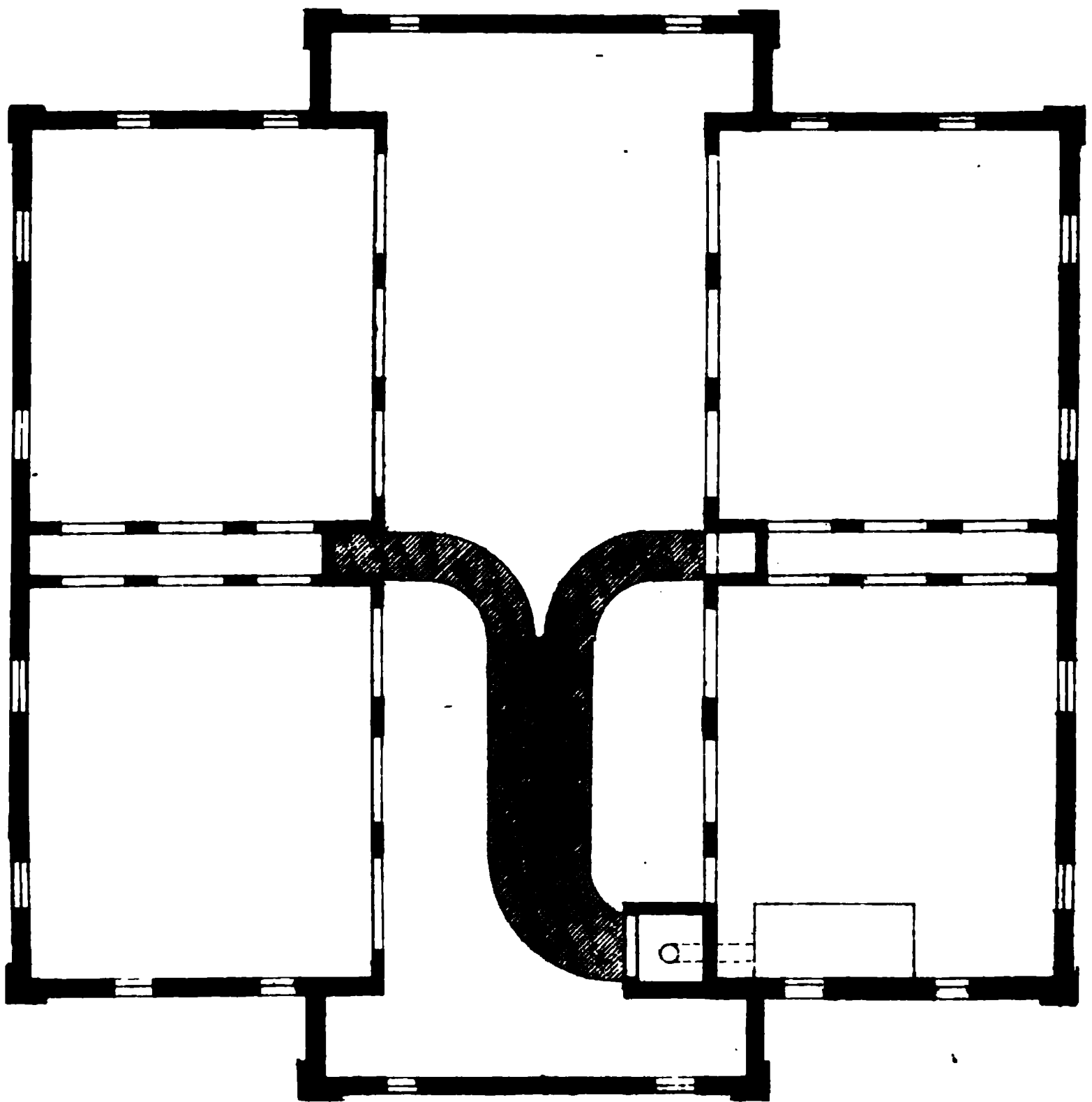


FIG. 3.
PLAN OF BASEMENT.

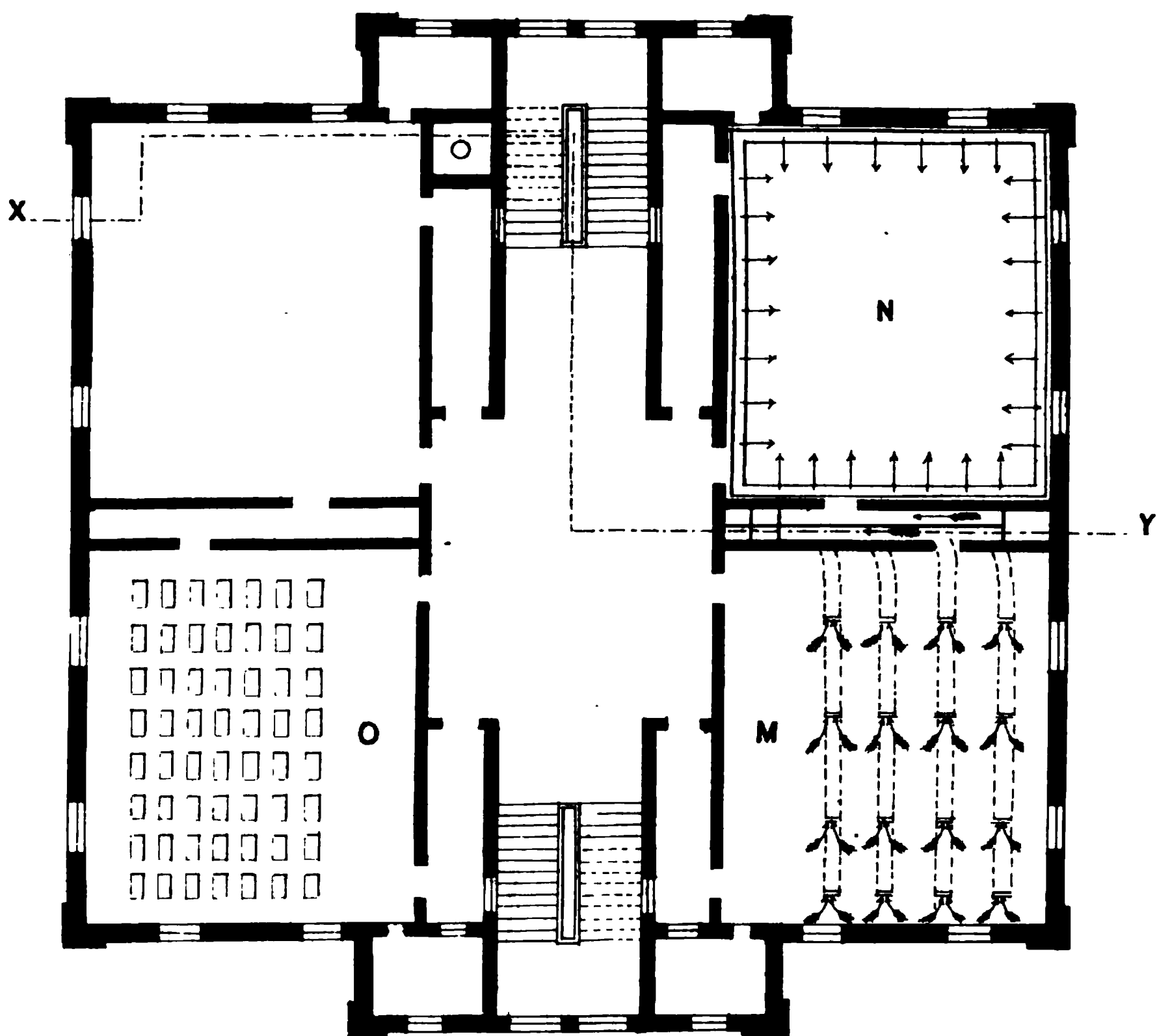


FIG. 4.
PLAN OF 1ST AND 2ND FLOORS.

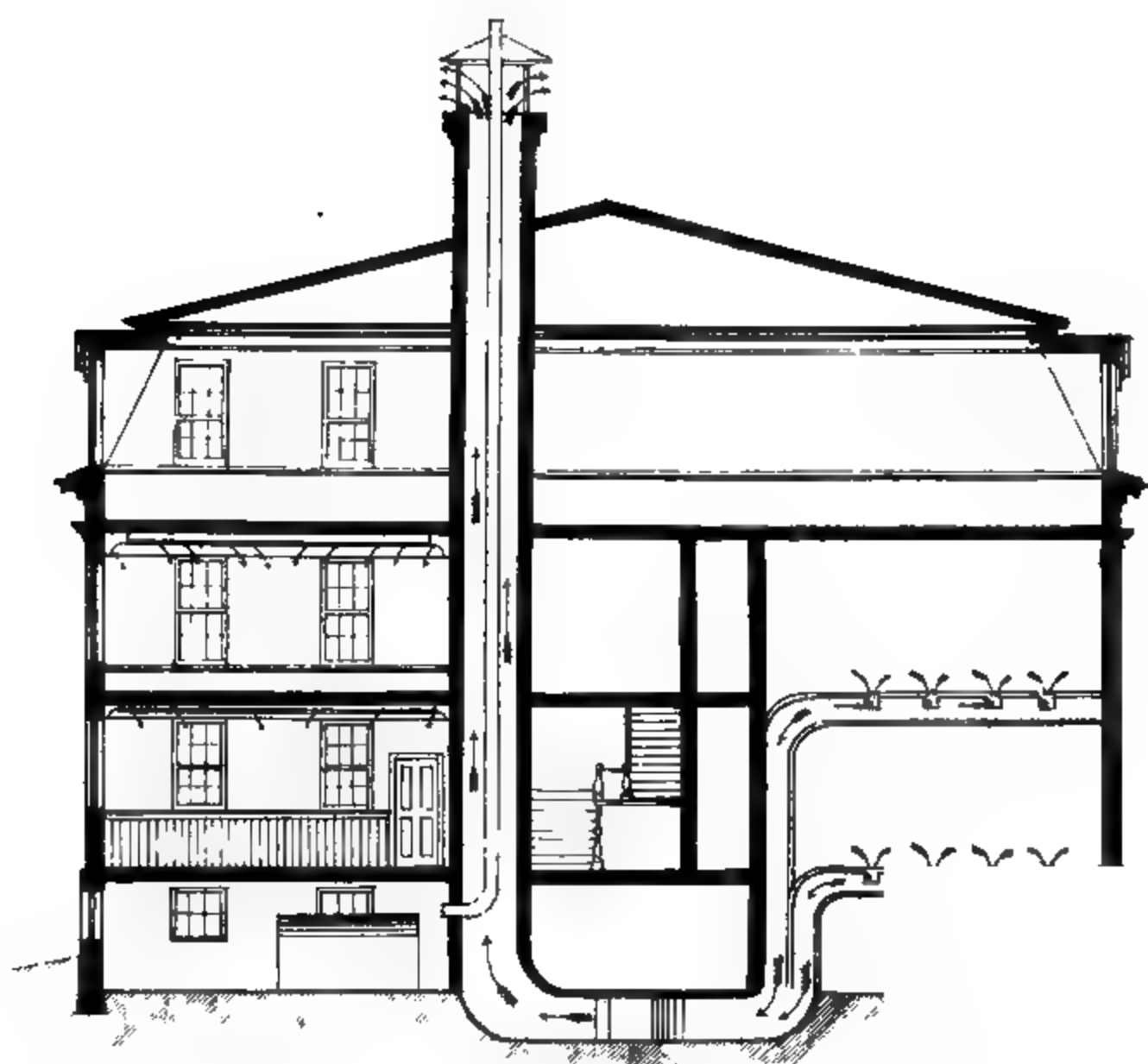


FIG. 5.
TRANSVERSE SECTION.

FIG.

FIG. '



FIG 8.
HORIZONTAL DUCT

THE WATER OF MYSTIC POND

AND ITS

SOURCES OF SUPPLY.

EXAMINATION OF THE WATER OF MYSTIC POND, AND OF ITS SOURCES OF SUPPLY.

The pollution of streams by industrial establishments and by the sewage of towns, has been several times during the past year brought to the notice of the State Board of Health.* Judging from the history of still more densely populated manufacturing districts in other parts of the world, the general subject will continue to claim the attention of the people of Massachusetts for many years to come. As the interests of life and health become more definite and more valued, and as manufactories and population grow and multiply, the apparent conflict in this respect between health and industry will yearly become more evident. It is our duty, if possible, to show that these important interests are not irreconcilable, and to give a word of warning in season to prevent their relations from being forgotten until it is too late to remedy the omission except at enormous cost.

It was thought best, for the present year, to take a single instance of alleged pollution of a stream, and examine it thoroughly. The selection of Mystic Pond and the sources of its supply was made chiefly in consequence of information received from a gentleman familiar with the locality, who requested us to investigate the "condition of the streams and ponds in the town of Woburn as affecting its inhabitants, and also the supply of the Charlestown water-works. The chief occupation of Woburn is that of tanning, and many of the establishments are placed near to some small stream which receives the filth from the beam-house where the hides are scraped and cleaned. These streams flow southward through Winchester, and supply the Mystic Pond and Charlestown water-works. There are also two glue factories, and a bone-

* At Stoneham and Melrose as well as at Woburn.

boiling establishment, which are far worse than the tanneries. The offensive odor of one of these streams has often been a source of complaint among those inhabitants who live south of Railroad Street, in a thickly-settled part of the town. This nuisance may be remedied without pecuniary loss, for the filth of these brooks may all be used as a fertilizer, by being collected in vats at the tanneries. This has already been done at one large establishment in Winchester, the tank being cleaned out often, and its contents distributed upon neighboring farms."

Our correspondent also refers to the foul condition, at times, of Horn Pond, the waters of which flow into Mystic Pond ; but, as will subsequently appear, they were not so found during the past summer.

The chemical examination of the waters of Mystic Pond and its tributaries was committed to Mr. William Ripley Nichols, Assistant Professor of General Chemistry at the Massachusetts Institute of Technology. In company with Mr. Nichols, the Secretary visited and selected the points at which specimens of water were taken on the first of April. A second set of specimens was taken on the ninth of August, after a drought so prolonged that some of the smaller streams of April 1st had disappeared. The report of Mr. Nichols is as follows :—

MASS. INSTITUTE OF TECHNOLOGY, }
BOSTON, September 15th, 1870. }

GEORGE DERBY, M. D., *Secretary of Mass. State Board of Health* :

DEAR SIR:—The examination of the waters supplying Mystic Pond was made at two different dates. The first set of specimens was taken April 1st, 1870. The description and locality of these waters, which are denoted by *Arabic* numerals in the Table, are as follows :—

No. 1.—A sample taken from a brook in North Woburn, about half a mile above Eaton's Chemical Works, at a point where the brook crosses the Lowell Railroad. Yellow.

No. 2.—From the same stream, just below the chemical works. Colorless.

No. 3.—From the surface of Horn Pond at its outlet. The pond was full and a rapid current setting out. Slightly turbid. No disagreeable odor or taste.

No. 4.—From a small stream draining a number of tanneries and emptying into the outlet of Horn Pond, at some distance from the

pond. The sample was taken at a point near its junction with said outlet, where the stream was flowing over numerous rocks, producing much foam. A disagreeable odor was apparent in its vicinity.

No. 5.—From the upper end of the reservoir, near “Bacon’s Bridge.”

No. 6.—At the dam opposite Whitney’s Machine-shop, Winchester.

No. 7.—From the same stream as No. 4, as it issues from the Cummings Tannery, where it is scarcely more than a drain. There was a rapid flow.

No. 8.—Mystic water drawn in Charlestown, April 5th.

No. 9.—Cochituate water drawn in the Laboratory of the Institute of Technology.

The second collection was made August 9th, after a very long period of dry weather. The ponds were moderately low and covered near their margins with a growth of aquatic plants. I observed no *green scum* or unpleasant odor. The draining stream from which Nos. 4 and 7 were taken in April, was perfectly dry. These samples, indicated in the Table by *Roman* numerals, were as follows:—

No. I.—From a brook in Cummingsville, Woburn, above Bacon’s Patent Leather Factory. Small brook in a cow-pasture, with little flow.

No. II.—From the same stream near its entrance into Horn Pond. The ground, marsh meadow; the brook of considerable size, flowing sluggishly; the water clear.

No. III.—From Horn Pond. Same locality as No. 3. Flow from pond slow; slightly turbid.

No. IV.—From a stream in East Woburn, at the place where it crosses Washington Street. Quite clear.

No. V.—Opposite Whitney’s Machine-shop, Winchester. Same locality as No. 6.

No. VI.—From Bacon’s Bridge. Same locality as No. 5.

No. VII.—Mystic water drawn in Charlestown, August 13th.

No. VIII.—Cochituate water from upper (eastern) part of lake, near the shore, August 31st.

No. IX.—Cochituate from Laboratory of Institute of Technology.

No. X.—The same.

No.	LOCALITY. (See description preceding.)	DATE.	No. of cubic cent. manganate to 4 times of per litre.	No. of cubic cent. solution to 100 parts of water.	SOLID RESIDUE AT 100° C.		LOSS ON GENTLE IGNITION.		CHLORINE.	Reaction for Nitrates.	Reaction for Sulphates.
					Parts in 100,000.	Grains in U. S. Gallon.	Parts in 100,000.	Grains in U. S. Gallon.			
1.	Brook, North Woburn,	April	27.7	2.75	3.59	2.10	1.35	0.79	Slight,	None.	Very slight.
2.	Same, below Chem. Works,	1,	22.4	5.1	11.16	6.51	1.33	0.77	Decided,	None.†	Very decided.
3.	Horn Pond, . . .	1,	16.8	4.9	6.9	3.55	1.67	0.97	Moderate,	Very slight.	Very slight.
4.	Tannery Stream, . . .	1,	30.0	9.3	18.45	10.77	3.23	1.98	Very decided,	Distinct.‡	Decided.
5.	Baco	1,	18.2	4.0	-	-	-	-	Slight,	Slight.	Slight.
6.	Whitney's Shop,	1,	15.8	3.5	-	-	-	-	Slight,	Slight.	Slight.
7.	Tanr	1,	35.6	-	7.38	-	1.95	1.13	Very decided,	-	Very decided.
8.	Mystic water, Charlestown,	5,	14.8	5.85	-	-	-	-	Moderate,**	Slight.‡	Very slight.
9.	Cochituate, . . .	5,	17.4	4.00	-	-	-	-	Slight,**	Very slight.¶	None.
I.*	Cammingsville, . . .	Aug.	5.6	4.9	6.30	3.68	1.62	0.95	Parts in 100,000.	Grains in U. S. Gallon.	-
II.	Horn Pond Inlet, . . .	9,	10.5	6.9	13.48	7.87	2.84	1.66	0.673	0.393	None.
III.	Horn Pond (3), . . .	9,	16.4	5.9	8.58	5.1	2.40	1.40	3.215	1.819	Distinct.
IV.	East Woburn, . . .	9,	21.7	5.5	-	-	-	-	1.673	0.977	None.
V.	Whitney's Machine Shop (6),	9,	20.4	6.6	9.14	5.34	2.54	1.48	1.154	0.674	None.
VI.	Bacon's Bridge (5), . . .	9,	19.4	6.8	10.42	6.8	3.00	1.75	1.942	1.134	None.
VII.	Mystic, Charlestown (8),	13,	11.4	-	8.00	4.67	2.90	1.28	1.981	1.156	Slight.
VIII.	Cochituate Lake, . . .	31,	-	-	6.66	3.88	-	-	1.654	0.965	None.
IX.	Cochituate, Boston, . . .	10,	-	3.8	-	-	-	-	-	-	-
X.	Cochituate, Boston, . . .	15,	-	-	-	-	-	-	0.372	0.217	-

* Between Nos. I. and II. there is a Morocco factory.

† Slight reaction for phosphates; moderate reaction for nitrates.

** Compare with Nos. VII. and X.

‡ Slight reaction for phosphates.

¶ Very slight reaction for nitrates.

Explanation of the Table.

The results are calculated both in terms of parts in 100,000, and of grains in a United States gallon of 58372.1754 grains (231 cubic inches), with the exception of those in the first two columns which are to be regarded simply as *comparative*.

The *permanganate* test was applied to the waters the day after they were collected, by adding to the water, after acidulation with sulphuric acid, a dilute solution of permanganate of potassium until a red color was produced which lasted ten minutes. [1,020 cubic centimetres of this solution oxidized 0.63 gram. crystallized oxalic acid.] For this test and for the determination of the dry residue, the waters were allowed to settle and were then drawn off from any sediment.

The *hardness* was determined by adding to 100 cubic centimetres of the water a dilute alcoholic solution of soap, until a permanent froth (lasting three minutes) was obtained. [34.2 cubic centimetres of the soap solution were required for 100 cubic centimetres of a solution containing 0.02775 gram. chloride of calcium.]

The test for nitrites was applied by adding to equal quantities (75 or 100 cubic centimetres) of the waters a drop or two of dilute sulphuric acid and a small quantity of iodide of potassium and starch; the amount of the blue coloration of the liquid was then observed.

In the second set of specimens, the chlorine was determined volumetrically by the use of a standard solution of nitrate of silver.

The map is traced from the "Map of Boston and its Environs," published by Baker and Tilden, Boston, 1867.

Respectfully submitted,
(Signed) WM. RIPLEY NICHOLS.

The conclusions reached by this investigation may be thus expressed :—

The permanganate test, showing the comparative amounts of readily oxidizable material contained in the water, is of a certain significance as marking the impurity of the tannery stream of April 1st, Nos. 7 and 4. Even at the latter point, where the current was swift and broken, it had not cleared itself of the foul character acquired a half mile above. But the permanganate test alone is not conclusive, since oxidizable substances in water may not be harmful, and we see this in the amount

found present in the specimen taken from the brook in the woods of North Woburn (No. 1) above all the sources of pollution. It was here due without doubt to vegetable matter derived from the banks or from fallen leaves. Horn Pond and the Winchester reservoir show no foulness by this test; although it will be observed that the amount of permanganate required increases in the second examination all the way along from Cummingsville to the reservoir. Here it requires less, and at Charlestown the water is found in this respect to be even more free from oxidizable material than the water of Boston.

The test for nitrites indicates the amount of nitrogenous matter undergoing decomposition; and the test for nitrates the amount of the same material which has undergone complete oxidation. The tannery stream (Nos. 7 and 4, April 1st) and the inlet of Horn Pond give evidence of the presence of such impurity.

As regards chlorine, it is agreed by chemists that all waters near the sea must contain a certain proportion. It is conveyed in the air in the form of common salt and deposited upon both earth and water. A familiar evidence of this general fact is found in the greater need of supplying salt to animals in the inland districts. It is also not improbable that Mystic Pond may contain some traces of sea-salt left by the ocean when it had access to its waters.

With these reservations the presence of any but minute amounts of chlorine may be taken as evidence that it has been caused by some form of impurity added to the water by man.

Chlorine increases quite steadily in amount from Cummingsville to the reservoir; the great and exceptional increase at the inlet of Horn Pond being due to the morocco factory just above. In the reservoir, uniting with other sources of supply, it is diluted, so that, when it reaches Charlestown, the amount is found to be about the same as at the outlet of Horn Pond,—considerably greater than in the Boston water.

The soap test is of practical value as denoting the amount of lime salts, or of other salts which harden the water.

Finally, it may be said that in so far as the Mystic water as delivered at Charlestown is concerned, the fears naturally entertained by those who were familiar with the foul conditions

through which a small portion of it is known to pass are not confirmed.

The impurities derived from the tanneries, when mixed with the great mass of water coming from sources of unquestionable purity, would probably, by the effect of dilution alone, make but little change in its general character. But there is a purifying influence constantly at work in the power which water possesses when freely exposed to air, and particularly when moved as in a running stream of ridding itself of oxidizable material. Water absorbs oxygen very freely, so that the gases held by water contain a larger proportion than the atmosphere.

The proportion of oxygen contained in the gases of ordinary water is as 33 in 100 parts by volume, while in air it is but 21.

These two influences, dilution and oxidation, are sufficient at present in the case of Mystic water to render it as received at Charlestown, Somerville and East Boston unquestionably good and wholesome.

That in the reaction for chlorides, nitrites and nitrates, and calcareous salts, it is not quite equal to the water of Boston, is not to be regarded as to its discredit, since the water of Cochituate Lake is of exceptional excellence.

The future of Mystic water depends upon the care which shall be taken to keep it free from additional impurity. When the stream which disappeared in the dry season between April and August began to flow again, it must have washed into Mystic Pond a large part of the refuse material which had accumulated about the tanneries on its banks. When, instead of twenty or thirty tanneries and glue factories and chemical works, there may be hundreds of such establishments on the little streams flowing into Mystic Pond, there will be reason to fear a dangerous pollution of its waters. Before that time arrives it is to be hoped that some economical and safe way may be universally adopted, not only to prevent the fouling of water, which like air should be kept pure for the benefit of all, but to return decomposing material to the land which may rightfully claim it as its due.

What we recognize as filth is only "matter in a wrong place."

The water of Charlestown, derived from Mystic Pond, stands thus as compared with the water of other cities :—

Numbers representing grains in United States gallon.

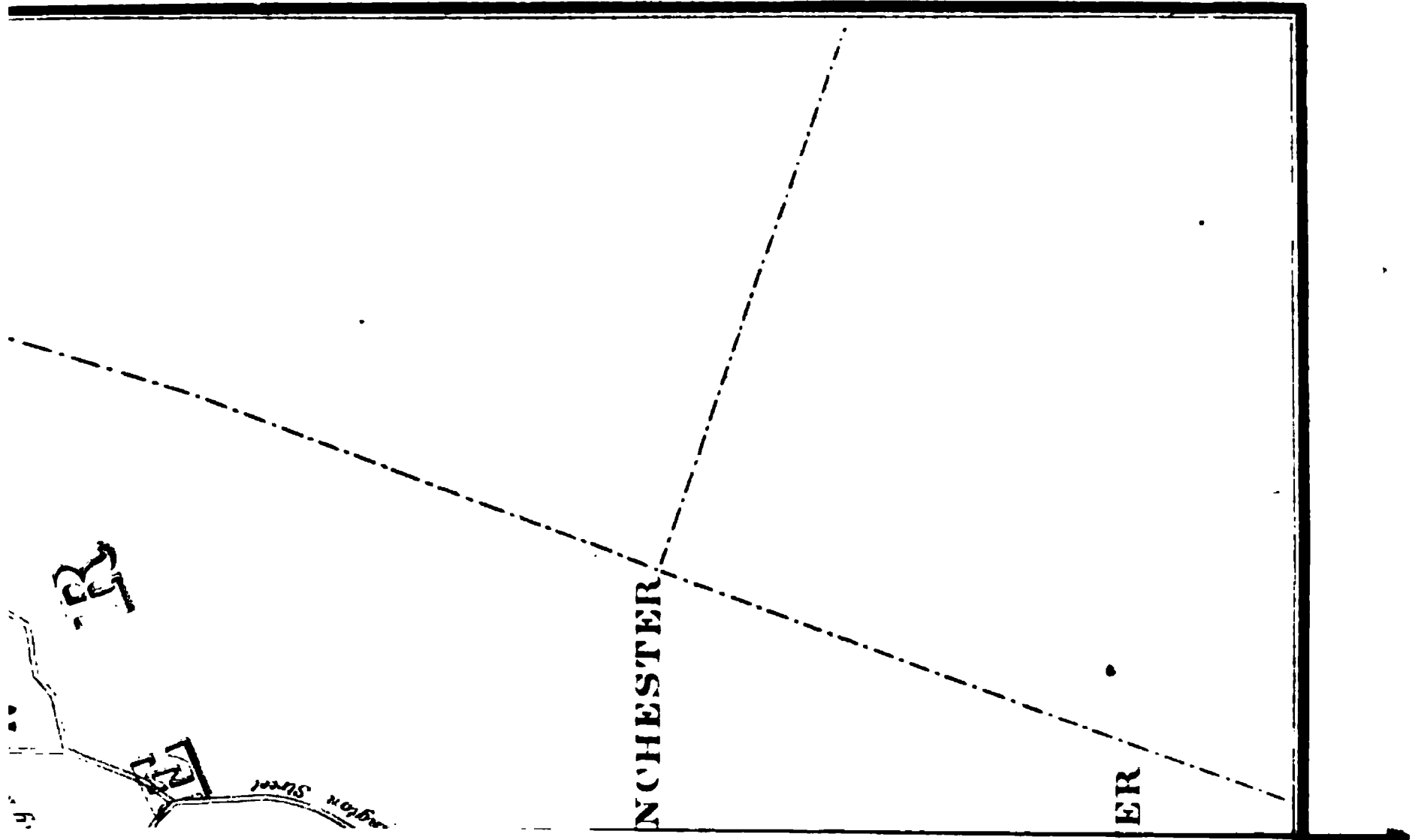
	Solid residue.	Inorganic matter.	Organic and volatile.
Charlestown,*	4.48	3.27	1.21
Boston,†	2.45	1.80	0.65
New York,‡	4.78	4.11	0.67
Philadelphia,§	4.08	4.04	0.04

Numbers representing parts in 100,000.

Charlestown,*	7.69	5.62	2.07
Boston,†	4.20	3.08	1.12
New York,‡	8.20	7.07	1.15
Philadelphia,§	6.99	6.93	0.06

* Prof. W. R. Nichols. Mean of results in preceding report.
† Prof. W. R. Nichols. Examination of Boston water, made at Institute of Technology, December, 1870.
‡ Prof. Chandler. 1870.
§ Prof. Boye. 1852. "Report of the Watering Committee."

22



AIR, AND SOME OF ITS IMPURITIES.

AIR, AND SOME OF ITS IMPURITIES.

No one can study the causes of disease without being convinced of the infinite importance of pure air to the preservation of health. This general truth meets us at every turn. Sometimes, as in the case of air spoiled by respiration, the reason is obvious enough to every one who understands the changes which take place in breathing; certainly, in so far as the interchange of oxygen and carbonic acid is concerned.

In other cases, as when air seems to be the vehicle for the transfer of the hidden poison of the zymotic diseases, it is, as yet, obscure. We do not propose, at present, to enter on this dangerous (because, as yet, partly hypothetical) ground. Allusion to it will be found in many pages of the present volume. Indeed, in any study of the causes of disease, at the present day, it is impossible to ignore it, however anxious we may be to keep within the strict bounds of scientific truth. In some way, as yet but imperfectly understood, the organic matter in air seems either to be or to contain the agent by which certain changes are impressed upon the blood in the lungs, which changes become the proximate cause of the phenomena of typhoid fever, and scarlet fever, and measles, and many other of our most destructive maladies. Whether this organic matter be waste tissue which has once had life and has now undergone some metamorphosis incident to decay, or whether it be living organism, seed, germ, spore or vital radicle of any sort, no one yet knows, or perhaps we should say, that no one who thinks he knows can yet prove his knowledge. The search for this foe to our health, for this hidden something which works with such fatal power, is keen. The chemists, the microscopists, the natural philosophers are all aiding in the study of its origin, its character, and the means of separating it from the air which all believe conveys it. It has even become, through the

popular teachings of Professors Tyndall and Huxley, a subject of rather general discussion during the past year. It should, however, never be forgotten that it is to the unobtrusive labors of men devoted to science like Dr. R. Angus Smith of England, labors pursued unremittingly for a quarter of a century, and modestly published in scientific reports, that we know all, or nearly all which is available in speculations on this obscure subject. The eloquent men who have recently interpreted the facts of Angus Smith and Pasteur and Beale and Hallier and Sanderson to the general public in a way to arrest the attention of the busy world, have in this respect done good service, but they have added almost nothing to the stock of existing knowledge.

We would gladly contribute our proportion of exact observation, however small it may be, to this great subject so full of interest and promise.

During the present year, careful note has been made of the proportion of carbonic acid contained in the air of enclosed places of various sorts, and also of the outer air at different seasons of the year. We hope to continue this line of research in future years, and, by the aid of chemists and microscopists, to determine the amount of organic matter which the air may hold under various circumstances, and to learn, if possible, something of its nature.

Although carbonic acid is not now generally regarded as a poisonous gas, but rather as an obstructor of respiration, and therefore impeding all vital processes, its amount in crowded and ill-ventilated rooms is a tolerably correct measure of the degree of impurity there present, and is specially worthy of observation as an index of the proportion of dangerous material coming from the waste of the body, with which, under such circumstances, it is always associated.

The amount of carbonic acid found in the fresh outer air will furnish a standard of the quality of the normal air of Massachusetts, and may also lead to a better knowledge of some of the peculiarities of the climate of our State in comparison with that of other countries.

In illustration of the value of the determination of very small amounts of impurity in air, we quote the following remarks of Dr. R. Angus Smith, from a paper on "Chemical

Climatology," in the *Scottish Meteorological Journal*, January, 1870:—

"Some people will probably inquire why we should give so much attention to such minute quantities,—between 20.980 and 20.999 of oxygen,—thinking these small differences can no way affect us. A little more or less oxygen might not affect us, but supposing its place occupied by hurtful matter, we must not look on the amount as too small. Subtracting 0.980 from 0.999 we have a difference of 190 in a million. In a gallon of water there are 70,000 grains; let us put into it an impurity at the rate of 190 in a million; it amounts to 13.3 grains in a gallon. This amount would be considered enormous if it consisted of putrefying matter, or any organic matter usually found in waters, but we drink only a comparatively small quantity of water, and the whole thirteen grains would not be swallowed in a day, whereas we take into our lungs from one thousand to two thousand gallons of air daily. The detection of impurities in air is, therefore, of the utmost importance; and it is only by the finest methods that they can be ascertained in small quantities of air, even when present in such quantity as to prove deleterious to health." * * * * * "If, by inhalation, we took up at the rate of thirteen grains of unwholesome matter per day,—half a grain per hour,—we need not be surprised if it hurt us. Such an amount is an enormous dose of some poisons, and yet this is not above one two-thousandth part of a grain at every inhalation. It is marvellous what small amounts may affect us, even when, by repeated action, they do not cumulate as certain poisons do. The carbonic acid numbers might have been used for this illustration, instead of the oxygen numbers, with the same result."

The examinations of air for carbonic acid were made at the Massachusetts Institute of Technology, under the direction of Professor Frank H. Storer, by Mr. A. H. Pearson of Haverhill. The results are as follows:—

L—OUTER AIR, IN BOSTON.

LOCALITY.	Percentage of Carbonic Acid, by Volume.	Date— 1870.	Time.	Temperature. Centigrade.	Barometer. Inches.	Remarks.
Newbury Street, near Institute Technology,	.04560	Mar. 17,	11.00 A. M.,	Deg. —3.5	29.830	Cloudy, wind N. W.
	.03194	Apr. 1,	8.45 "	9	30.872	Clear, wind N. E.
	.03894	1,	8.45 "	9	30.872	" "
	.03988	8,	9.40 "	13	30.134	" "
	.04449	8,	9.40 "	13	30.134	" "
	.04218	8,	9.40 "	13	30.134	" "
	.03798	13,	11.00 "	14	30.000	Clear, wind N.
	.04435	13,	11.00 "	14	30.000	" "
	.04230	14,	2.35 P. M.,	25	30.016	Clear, wind S. W.
	.04292	14,	2.35 "	25	30.016	" "
	.04999	28,	2.20 "	28	29.872	Cloudy, wind S. W.
	.04903	28,	2.20 "	28	29.872	" "
Park Street, near Tremont,	.04493	May 3,	8.30 "	14	29.936	Clear, wind N.
Newbury Street,	.03394	12,	2.45 "	22	29.852	After storm; light clouds; wind S. W.
	.03561	12,	2.45 "	22	29.852	After storm; light clouds; wind S. W.
Public Garden,	.02905	17,	10.45 A. M.,	14	30.170	Cloudy, wind N. E.
	.03563	18,	4.05 P. M.,	22	30.336	Clear, wind S. W.
Cupola of State House, Clarendon Place, near Berkeley Street,	.02969	19,	10.50 A. M.,	25	30.244	" "
	.02586	30,	3.40 P. M.,	20	30.264	Clear, wind S. E.
	.03139	18,	3.15 "	20.5	30.336	Clear, wind S. W.
	.03371	19,	1.30 "	28	30.212	" "

II.—ROOMS AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

LOCALITY.	Percentage of Carbonic Acid, by Volume.	Date— 1870.	Time.	Temperature. Centigrade.	Barometer. Inches.	Remarks.
Small "weighing-room," Laboratory Institute Technology, . . . . .	.13205	Mar. 15,	3.00 P. M.,	Deg. 22	30.190	-
	.13041	15,	3.00 "	22	30.190	-
Drawing-room, Second Year, Institute Technology, . . . . .	.08836	16,	9.40 A. M.,	14	29.760	Wind N. E.
	.08416	16,	9.40 "	14	29.760	" "
	.05698	16,	5.00 P. M.,	15	29.760	" "
	.05551	16,	5.00 "	15	29.760	" "
Room 11, after recitation, Institute Technology, . . . . .	.09762	17,	1.15 "	21	29.330	-
	.08929	17,	1.15 "	21	29.330	-

III.—AIR OF SCHOOL-ROOMS IN BOSTON.

Grammar Schools.		Mar.	10.25 A. M.,	Deg.		
Myrtle Street, . . . . .	.13481	24,	10.25 A. M.,	23	30.200	-
Dartmouth Street, . . . . .	.13659	24,	10.30 "	23	30.200	-
Hawkins Street, . . . . .	.12912	25,	10.30 "	18	30.430	-
Tremont Street, . . . . .	.09748	29,	10.20 "	21	29.906	-
Waltham Street, . . . . .	.14835	29,	3.00 P. M.,	28	29.950	-
Common Street, . . . . .	.12111	29,	3.30 "	18	29.950	-
West Springfield Street, . . . . .	.17686	30,	10.05 A. M.,	18	30.260	-
Blossom Street, . . . . .	.10164	31,	10.25 "	21	30.396	-
North Bennet Street, . . . . .	.19037	Apr. 5,	10.30 "	22	29.900	-
Richmond Street, . . . . .	.17887	6,	10.15 "	18	29.920	-
	.17781	11,	10.10 "	20	30.196	-

Anderson Street, .	.	.	.	.	.	.08570	Apr.	12,	10.10 A. M.,	23	29.648	-	-
Northampton Street,	.	.	.	.	.	.18622		18,	10.10 "	22	29.982	-	-
Tyler Street, .	.	.	.	.	.	.12586		18,	3.35 P. M.,	20	29.850	-	-
South Street, .	.	.	.	.	.	.17598	May	10,	10.15 A. M.,	23	30.114	-	-
Primary Schools.													
Appleton Street, .	.	.	.	.	.	.11092	Mar.	25,	3.15 P. M.,	20	30.460	-	-
Hanover Street, (Station-house,)	.	.	.	.	.	.14296		28,	10.30 A. M.,	20	29.556	-	-
110 Merrimack Street, .	.	.	.	.	.	.18187		28,	11.15 "	20	29.556	-	-
Poplar Street, .	.	.	.	.	.	.11173	Apr.	5,	11.15 "	20	29.900	-	-
North Bennet Street,	.	.	.	.	.	.16824		6,	10.25 "	20	29.920	-	-
Richmond Street, .	.	.	.	.	.	.08101		11,	10.20 "	22	30.196	-	-
Phillips Street, .	.	.	.	.	.	.08971		12,	10.20 "	22	29.648	-	-
West Concord Street,	.	.	.	.	.	.13999		18,	10.25 "	21.5	29.982	-	-
Tyler Street, .	.	.	.	.	.	.11015		18,	3.50 P. M.,	19	29.850	-	-
Newbern Place, .	.	.	.	.	.	.15541		19,	11.35 A. M.,	23	29.796	-	-
Warrenton Street, .	.	.	.	.	.	.14575		19,	11.50 "	22	29.796	-	-
Suffolk Street, .	.	.	.	.	.	.10618		19,	3.35 P. M.,	22.5	29.750	-	-
Cooper Street, .	.	.	.	.	.	.19927		21,	9.55 A. M.,	22	29.888	-	-
Thacher Street, .	.	.	.	.	.	.17292		21,	10.10 A. M.,	23	29.888	-	-
Sheafe Street, .	.	.	.	.	.	.18692		21,	3.40 P. M.,	22.5	29.856	-	-
Snelling Place, .	.	.	.	.	.	.16056		21,	3.55 "	19	29.856	-	-
Genesee Street, .	.	.	.	.	.	.16082		22,	9.50 A. M.,	23	30.050	-	-
Way Street, .	.	.	.	.	.	.12284		22,	10.15 "	23	30.050	-	-
Groton Street, .	.	.	.	.	.	.14507		25,	11.20 "	20	30.092	-	-
Rutland Street, .	.	.	.	.	.	.11663		25,	11.45 "	22	30.092	-	-
Hudson Street, .	.	.	.	.	.	.13024	May	9,	3.40 P. M.,	18	29.856	-	-
Common Street, .	.	.	.	.	.	.07732		9,	3.55 "	18	29.856	-	-
East Street, .	.	.	.	.	.	.16988		10,	10.05 A. M.,	22.5	30.114	-	-
Chardon Street, .	.	.	.	.	.	.09934		11,	10.15 "	22.5	30.084	-	-
Blossom Street, .	.	.	.	.	.	.12708		11,	10.50 "	21	30.084	-	-

IV.—AIR OF HALLS, &c., IN BOSTON.

LOCALITY.	Percentage of Carbonic Acid, by Volume.	Date— 1876.	Time.	Temperature— Centigrade.	Barometer, Inches.	Remarks.
Music Hall, Tremont Street, . . .	.14045	May 4,	4.05 P. M.,	Deg. 25	29.576	-
Crystal } . . .	.08580	17,	2.30 P. M.,	28	30.242	-
Street, . . .	.08976	17,	2.50 "	15	30.242	-
Street, . . .	.15289	Apr. 27,	9.05 "	26	30.080	-
Street, . . .	.12047	20,	1.30 P. M.,	28	29.784	-
Street, . . .	.08914	Mar. 22,	2.45 "	24	29.892	-
Street, . . .	.16188	Apr. 4,	3.30 "	20	29.724	-
Street, . . .	.14488	11,	9.00 "	23	29.952	-
Street, . . .	.06929	15,	11.00 A. M.,	21	30.292	-
Street, . . .	.18666	Mar. 19,	2.30 P. M.,	20	30.150	-
Street, . . .	.18747	19,	3.45 "	21.5	30.150	-
Public Library, waiting-room, . . .	.19853	Apr. 20,	7.50 "	23	29.784	-

NOTE.—The method employed in the above analyses was the one generally known as Pettenkofer's. It consists in acting upon a known volume of air, with a certain quantity of standard baryta-water, and so removing the carbonic acid as carbonate of baryta.

After acting upon the air for about half an hour, the baryta solution is poured into a cylinder, allowed to deposit, with exclusion of air, the carbonate of baryta which has been formed, and then the free baryta remaining in solution is determined with a standard oxalic acid solution.

The difference between the amounts of oxalic acid required to neutralize the baryta, before and after the operation represents the carbonate of baryta formed, and consequently the carbonic acid present.

The baryta solution is prepared by dissolving seven grammes of hydrate of baryta in one litre of water; one cubic centimetre of this solution corresponds to about one milligramme of carbonic acid. The precise strength of the solution is determined by means of oxalic acid as described below. In the above experiments 1.087 cubic centimetres of the baryta solution corresponded to one cubic centimetre of oxalic acid solution.

The oxalic acid solution is prepared by dissolving 2.8636 grammes of pure oxalic acid in water, and diluting the solution to the volume of one litre. One cubic centimetre of this solution corresponds to one milligramme of carbonic acid.

The strength of the baryta-water is determined by running the oxalic solution from a burette into a certain quantity of the baryta-water, until a drop of the mixture fails to give a brown ring on delicate turmeric paper.

It will be observed that all the examinations of air by Mr. Pearson were made in the spring of 1870.

Another series was made for the Board of Health in winter, when the average temperature of the outer air was at about the standard of our three coldest months—a little below the freezing point of water. The following record shows the results of examination of the outer air for carbonic acid made at the Laboratory of Harvard University, Cambridge, by Mr. H. B. Hill, Assistant in Chemistry.

While this Report is passing through the press Mr. Hill sends us also a record of three examinations of air for carbonic acid, made in a recitation room of Harvard College.

OUTER AIR, IN CAMBRIDGE.

LOCALITY.	Percentage of Carbonic Acid, by Volume.	Date— 1870.	Time.	Temperature. Centigrade.	Barometer. Eng. Inches.	Remarks.
College Yard, 20 feet north of Boylston Hall,	0.0375	Dec. 29,	4.00 P. M.,	Deg. —5	29.457	{ Cloudy, snow during previ-
	0.0376	30,	12.00 M.,	—9	29.973	ous 24 hours.
	0.0308	30,	4.00 P. M.,	—7	29.973	Wind S. W., fair.
	0.0344	31,	11.00 A. M.,	+3	29.665	Wind S., cloudy.
	0.0364	31,	2.00 P. M.,	+6	29.626	Wind S. W., fair.
		1871.				Wind S.
	0.0343	Jan. 2,	3.30 P. M.,	+4	29.649	Wind S. W., cloudy.
	0.0310	3,	11.00 A. M.,	0	30.063	Wind S. W., clear.
	0.0311	3,	2.30 P. M.,	—1	30.000	—
	0.0331	4,	11.00 A. M.,	—5	30.240	Wind W., clear.
	0.0332	4,	3.30 P. M.,	—5	30.264	—
	0.0333	5,	9.00 A. M.,	—3	30.158	Wind S. E., cloudy.

AIR OF A RECITATION-ROOM,* HARVARD COLLEGE.

Recitation Room of Boylston Hall, . . .	0.0683	1871.	12.00 M.,	Deg. 20	30.130	After one hour's recitation.
	0.0581	Jan. 10,	5.00 P. M.,	20	30.028	After ½ hour's recitation.
	0.0613	17,	6.00 "	24	30.028	After 1½ hours' recitation.

* Air taken fifteen minutes after the recitation was over.

Mr. Pearson's twenty-one observations of the outer air of Boston in *spring* give an average of 385 parts of carbonic acid in a million. Mr. Hill's eleven observations of the outer air of Cambridge in *winter* give an average of 337 parts of carbonic acid in a million.*

In the forty school-rooms examined by Mr. Pearson, the average proportion of carbonic acid found was 1,393 parts in a million, or nearly four times the normal amount existing in the outer air. The highest was 1,993, and the lowest 773 parts in a million.

• It would not be fair to regard these figures as representing the amount of ventilation in different schools, as the examinations were made sometimes near the close of a session, and sometimes immediately after a recess when the windows had been open. The weather would also greatly influence the activity of air currents. But the average may be taken as a correct statement of the quality of air in the Boston schools.

The following letter from Mr. Charles Stodder, of Boston, an accomplished microscopist, will show what he was requested to do for the Board of Health. Although his results are inconclusive and almost completely negative, it is thought right to publish an account of this honest effort to reach the truth.

The presence in air of objects too minute for identification, leaves the whole question open for future investigation and discovery. The molecular movement of particles devoid of life is clearly exhibited by Mr. Stodder to whoever will examine his specimens.

The examination of dust deposited on a beam eight or ten feet from the floor, in a large room at the Springfield Armory, shows how metals may be floated about in the air, and if metals surely anything else in particles equally minute.

* Dr. Angus Smith (1869) gives the following amounts of carbonic acid found in the open air in England:—

Hills above 3,000 feet high,	.	.	.	.	.	.	336 parts in a million.
between 1,000 and 2,000 feet high,	.	.	.	.	.	.	334 " "
below 1,000 feet high,	.	.	.	.	.	.	337 " "
At the bottom of the same hills,	.	.	.	.	.	.	341 " "
Streets of London, (summer,)	.	.	.	.	.	.	380 " "
London Parks,	.	.	.	.	.	.	301 " "
On the Thames, at London,	.	.	.	.	.	.	343 " "
Manchester Street, (ordinary weather,)	.	.	.	.	.	.	403 " "
During fogs in Manchester,	.	.	.	.	.	.	679 " "

DR. GEORGE DERBY, *Secretary of the State Board of Health* :

DEAR SIR :—So much interest had been created in the medical profession and among microscopists, by the various reports of the microscopical investigation of the dust floating in the air, especially by the surprising results said to have been obtained by Mr. Dancer, of Manchester, England, as reported by Dr. Angus Smith, and by the widely published lecture of Prof. Tyndall, on “Dust and Disease,” that it was with pleasure I received your request to search for the microscopic contents of the air of Boston.

Dr. Angus Smith obtained his examples by putting a small quantity of water into a large bottle, and shaking the bottle, repeating the process many times, with new volumes of air and the same water. This appeared to me to be an unsatisfactory mode, and I devised an apparatus by which I could pass some thousands of measured volumes of air through one volume of water, thus, as I then thought, completely washing the air which passed through. Yet when we reflect that the bubbles of air in the water, though they may be only the one-hundredth, or even half an hundredth of an inch in diameter, are of large size when compared with the particles of matter in the air, many of which are so small as one-one-hundred thousandth ($\frac{1}{100000}$) of an inch, we see that such may escape contact with the water, and thus elude observation. Still, the substances detained by the water are probably nearly all the larger particles, and representations in kind, if not in quantity, of those floating in the atmosphere.

My first experiment was made with filtered Cochituate water, which to the eye appeared perfectly clear and free from foreign matter. In this I found such objects as will be hereafter mentioned, but especially scaly particles of apparently organic origin, and numerous minute, translucent spherical or granular bodies,—such as I suppose Mr. Dancer called germs. Something created suspicion that the water was not pure. A little of it was evaporated on a glass slide, and examined with the microscope. It had left a deposit of the same scaly and spherical particles. Other observers had used distilled water. I procured some from two sources, which had been distilled some weeks, but kept with care; both proved more impure microscopically than the filtered water. This put a stop to experiments for several weeks until a new supply of fresh distilled water could be obtained. A friend prepared some expressly for me with the utmost care, with the best apparatus. To my surprise, a drop of this water, evaporated, left a deposit visible to the naked eye, and, under the microscope, showing (as you yourself have seen) abundance of the same scales and granules.

This result put an end to this mode of investigation, and throws a cloud of suspicion on all reported researches in this line, when water was the medium used.* My object in the use of water was, that if spores, germs or eggs were found, their development and growth might be watched, and, if possible, their nature might be ascertained, or at least it might be determined that they really were spores or germs, believing as I do, that mere particles of matter have been taken for organisms. Other modes of collecting the dust of the atmosphere are by taking the deposited dust of rooms, or by causing a current of air to impinge against a surface of glass smeared with glycerine, when a portion of the floating particles will be caught by the viscid surface. In these methods, we can judge of the nature of the dust only by its present appearance,—there will be no growth. Both of these methods I have tried, but not so extensively as is desirable; my observations have been entirely on the air in a room in Dover Street, and that of the yard attached, a locality tolerably free from the dust of the street, and with but little vegetation in the neighborhood. I have used a Tolles' microscope with object glasses of "unsurpassed excellence," magnifying from 250 to 1,200 diameters.

The dust collected in the yard varied but little in its contents from that in the room. I have found scales resembling dead epithelial scales, filaments of cotton, wool and flax, woody fibres, all abundant; some pollen grains, scales of moths' wings, hairs and parts of insects, starch grains, grains of inorganic matter, sand, &c. Such things are reported by all observers; besides, some of them report immense numbers of spores or germs. I find great numbers of particles; I cannot say that they are germs or are not, that they are organisms or are not, or even that they are organic or inorganic. Some observers have used a power of 250 or 300 diameters, perhaps poor quality at that, found something, and rushed to the printer. Any microscope shows objects (in such collections) too minute to be identified. Increase of "power" may identify them, if the instrument is a good one, but it only brings into sight another set, in the same category; another increase of power repeats the process with a third set, and so it may continue *ad infinitum*. I doubt if the best microscopes (inferior ones are out of the question) can determine whether a minute particle is, I will not say an organism, but whether it is organic matter. Some observers have apparently considered motion an evidence of life. Certain movements may be positive evidence, but there is a molecu-

* It is to be remarked that we know nothing concerning the special means employed by Mr. Dancer to secure the purity of water.—SEC'Y.

lar movement common to particles of inorganic (clay, chalk, &c.), as well as to organic matter which may be mistaken for life even by experts, and the particles themselves for animated beings. I have a slide of coagulated albumen which has been prepared and closed up for seventeen months; in this there may be seen, in the field of the microscope, at one view, thousands of minute globules (too small to be distinguished with a power of 200 diameters), in constant movement. There can be no life in the matter, yet numerous experts have seen it and pronounced it life, and only one recognized it for what it is. Such things should teach caution to investigators to be not hasty in pronouncing conclusions.

In workshops and manufactories, dust may be and is present in such quantity and quality as may be supposed capable of impairing health. As for example, I examined at your request the dust deposited in the polishing shop of the U. S. armory in Springfield. It is a fine black powder. I found in it a few vegetable fibres, a few apparently organic fragments and broken crystals; but two-thirds to three-fourths of it was particles of iron, in amorphous fragments and of various dimensions from 1-100 m. m. upward, and curved and irregular fibres and masses of iron, with sharp, jagged edges, from 5 to 15 m. m.; and some very minute perfect spheres, probably iron. It can hardly be doubted that continual breathing an atmosphere charged with *such* dust must be injurious, —but that belongs to the medical profession to decide, not to me.

I thought I might separate the iron of this dust from the other constituents, by means of a magnet. To my surprise, the magnet took the whole of the dust from a white paper, as completely as could have been done with a brush. As the iron is all that is really attracted by the magnet, is it probable that all the particles of the dust are sufficiently coated with oil to be adhesive, so that they all stick together. This suggests a means by which it is likely a large portion, if not all, of the dust may be separated from the air, and thus rendered harmless. Let permanent, or, by preference, electro-magnets be placed abundantly about the grindstones and polishing wheels, and the dust will adhere.

I have only to add my regret that I have been able to accomplish so little.

Respectfully yours,

(Signed)

CHARLES STODDER.

Boston, Dec. 25th, 1870.

HEALTH OF MINORS

EMPLOYED IN

MANUFACTORIES OF COTTON, WOOLLEN, SILK, FLAX AND JUTE.

HEALTH OF MINORS.

The legislature of 1870 passed the following Resolve:—

“Resolved, That it shall be the duty of the Board of Health to specially ascertain and include in their annual report to the legislature on the whole number of minors employed in all the cotton, woollen, silk, flax, and jute manufactories in this Commonwealth, and the cause, amount and rate of mortality among them, and how it compares with the mortality of all other persons of the same age in this Commonwealth during the same periods of time, and how far the particular employment of such minors affects their general health as compared with the effects of other employments upon the general health of other persons of similar ages.”

In compliance with this Resolve the State Board of Health made application to the Secretary of the “American-House Manufacturer’s Committee,” for a list of persons or corporations engaged in such manufactures.

This information was furnished in July, 1870, and on the 1st day of August, the following circular was sent to 636 persons or corporations. (After quoting the Resolve above referred to), “Will you have the kindness to furnish the State Board of Health with replies to the following questions:—

[It is necessary to classify the ages as between 10 and 15, and 15 and 20, in order to correspond with the returns of the Registration Reports and of the Census.]

1.—What do you manufacture?

2.—How many persons of both sexes of the ages of 10 to 14 years, both inclusive, were employed by you on the 1st of August, 1870?

What was the average number during the year 1870?

3.—How many persons of both sexes of the ages of 15 to 19 years, both inclusive, were employed by you on the 1st of August, 1870?

What was the average number during the year 1870?

4.—How many deaths occurred among those of both sexes employed by you in 1870, of the ages of 10 to 14 years, both inclusive?

Of these deaths how many were caused by—

Accidents from machinery ?

Consumption ?

Other diseases ?

5.—How many deaths occurred among those of both sexes, employed by you in 1870, of the ages of 15 to 19 years, both inclusive ?

Of these deaths how many were caused by—

Accidents from machinery ?

Consumption ?

Other diseases ?

6.—What proportion of your employees of both sexes of all the above ages, remained in your service throughout the year 1870 ?

7.—What was the average length of service of your employees of both sexes, of all the above ages, during the year 1870 ?

[The object of the two preceding questions is to endeavor to ascertain in what degree the changes occurring among employees may affect the value of statistics of mortality.]

In addition to the above information, which we are required by the legislature to obtain, will you also give us replies to the following questions :—

8.—What was the percentage of absence from work on the part of your employees of all ages by reason of sickness in 1870 ?

9.—Which class of employees suffer least loss of time from sickness, those who live in tenements provided by you or those who live in tenements provided by others ?

10.—Do those of your employees who have been in the United States less than one year suffer from sickness in a greater or less degree than others ?

11.—In case of sickness, is it the duty of any one to see that no suffering is caused by neglect of proper attention ?

12.—Do you endeavor to *prevent* sickness, by providing fresh air in the work-rooms and sleeping-rooms, and by supervision of cellars, sinks, privies, cesspools and pigsties ?

13.—Do you limit the number of persons who shall occupy sleeping-rooms of a certain size ?

14.—Do you guard against smallpox, by systematic vaccination ?

15.—How many hours do you work in each week ?

As the report of the State Board of Health must, by statute, be presented to the legislature in January, it becomes necessary that replies to the foregoing questions should be mailed to our address on the first day of January, 1871.

Very respectfully, your obedient servant,

GEORGE DERBY, M. D.,
Secretary of the State Board of Health.

On the 20th of December, 1870, the circular was again sent to all parties above referred to, together with stamped and directed envelopes for replies.

The result of this endeavor to obtain the information required by the legislature is seen in the following abstract. The list was made up January 11, 1871, and from that time to the present, (January 16), only three additional letters have been received.

ABSTRACT OF MANUFACTURERS' REPLIES

To questions addressed to them by the State Board of Health, by order of the Legislature.

Circulars were sent to	636
Cotton,	256
Wool,	341
Silk,	21
Flax,	15
Jute,	3
	— 636
Replies were received from	218
Cotton,	97
Wool,	106
Silk,	5
Flax,	8
Jute,	2
	— 218
Returned by post-office,	23
Returned by mill owners not manufacturing,	46
Missent to manufacturers not of the above classes,	3
	— 290
Not heard from,	346

[To avoid unnecessary repetition, a general reference is here made in the following tabular replies to the corresponding numbers of the questions on pages 410 and 411.]

Second Question.

	No. of Replies.	Having none under 15.	Aggregate No. employed under 15.	Average No.	Greatest No. in any one Mill.	Least No.
Cotton, . . .	94	17	2,850	30.5	265	1
Woollen, . . .	96	20	1,082	14.2	135	1
Silk,	5	1	77	19.2	62	1
Flax,	8	4	114	28.5	49	2
Jute,	2	1	80	8.0	—	—
Total, . . .	205	43	3,653	22.5	265	1

Average.

Cotton, . . .	89	10	2,072	26.2	286	1
Woollen, . . .	99	13	1,212	14.	125	1
Silk,	5	1	66	14.	52	1
Flax,	8	4	117	29.2	47	1
Jute,	2	—	80	40.	50	80
Total, . . .	203	28	3,457	20.2	286	1

Third Question.

	No. of Replies.	No. employ- ing none under 20.	Aggregate No.	Average.	Greatest.	Least.
Cotton, . . .	95	8	5,672	67.5	1,106	1
Wool,	102	4	2,748	27.9	293	1
Silk,	5	1	212	53.	109	1
Flax,	8	—	269	83.6	125	4
Jute,	2	1	78	78.	78	78
Total, . . .	212	14	8,979	52.	1,106	1

Average.

Cotton, . . .	93	2	5,956	65.4	1,100	1
Wool,	100	2	2,859	29.2	815	1
Silk,	5	—	204	40.8	100	2
Flax,	8	—	283	85.4	146	3
Jute,	2	—	108	54.	78	30
Total, . . .	206	4	9,410	44.9	1,100	1

Fourth Question.

	Replies.	None.	1 each.	2 each.	Total.	Accident.	Consumption.	Other Diseases.	Total.
Cotton,	95	81	11	3	14	3	4	10	17
Wool,	102	100	2	-	2	1	-	1	2
Silk,	5	5	-	-	-	-	-	-	-
Flax,	8	8	-	-	-	-	-	-	-
Jute,	2	2	-	-	-	-	-	-	-
Total,	212	196	13	3	16	4	4	11	19

NOTE.—Many of the mills report no deaths in their employees during a long series of years. A considerable number say, moreover, that minors leaving their mills are lost sight of, and that whether they subsequently die, from disease or otherwise, cannot therefore be known.

Fifth Question.

	Replies.	None.	1 each.	2 each.	3 each.	4 each.	7 each.	Total.	Accident.	Consumption.	Other Diseases.	Total.
Cotton,	94	72	14	3	2	2	1	22	1	16	24	41
Wool,	104	94	6	2	1	1	-	10	1	6	10	17
Silk,	5	5	-	-	-	-	-	-	-	-	-	-
Flax,	8	7	1	-	-	-	-	1	-	1	-	1
Jute,	2	2	-	-	-	-	-	-	-	-	-	-
Total,	213	180	21	5	3	3	1	33	2	23	34	59

Sixth Question.

	Replies.	Reporting 100 per cent.	Reporting none.	Average per cent.
Cotton,	87	13	2	74.
Wool,	91	16	6	71.
Silk,	4	1	1	58.
Flax,	8	2	1	74.
Jute,	1	-	-	75.
Total,	191	32	10	70.*

* General average.

Replies to this question are given approximatively, the manufacturers reporting in some cases that they do not fully understand the question, in others that their records do not enable them to reply with accuracy, in others that they are unable to determine with greater precision ; only a small minority give absolute answers.

Seventh Question.

	Replies.	Average Months.	Longest.	Shortest.
Cotton,	74	9	12	4
Wool,	80	9½	12	4
Silk,	3	8½	12	5
Flax,	5	11½	12	11
Jute,	—	—	—	—
Total,	161	9½	12	4

Eighth Question.

	Replies.	Average per cent.
Cotton,	54	2
Wool,	80	1½
Silk,	3	¾ of 1
Flax,	5	¾ of 1
Jute,	1	" Very small."
Total,	143	1½

The replies show considerable variation in the estimate of absence, the extremes being 5 per cent. and 0. The great majority admit their replies to be only approximative, while a large number explain that "absence by reason of sickness" may mean indisposition to work from many other causes. One manufacturer replies that his employees "seem fresher on Saturday night than on Monday morning." Many assert that absence in their mills has been too trifling to be reckoned.

Ninth Question.

	Those in Compa- ny's Tenements.	Those living in their own.	Doubt expressed, &c.	Total Replies.
Cotton,	22	7	62	91
Wool,	11	3	80	94
Silk,	—	1	4	5
Flax,	1	—	5	6
Jute,	—	—	2	2
Total,	34	11	153	198

Of the 152 replies to question 9, about half say there is no perceptible difference; the rest are nearly all from those who either exclusively do or do not own the tenements, and are thus unable to institute a comparison.

Tenth Question.

	In a greater degree.	In a less degree.	Non-com- mittal.	Total.
Cotton,	15	3	69	87
Wool,	16	3	72	91
Silk,	—	—	4	4
Flax,	1	1	4	6
Jute,	—	—	2	2
Total,	32	7	151	190

Those whose answers are not absolute, either misunderstand the question, and answer it "yes" or "no," instead of "greater" or "less;" or "do not employ the foreigners" referred to, or, if employing them, "do not perceive any difference."

Eleventh Question.

	Yea.	No.	Total.
Cotton,	65	27	92
Wool,	58	37	95
Silk,	2	3	5
Flax,	3	5	8
Jute,	—	1	1
Total,	128	78	—

Many of the larger mills report that they make special provision in case of sickness, in the employment of corporation physicians, hospitals, relief societies, nurses, &c. In some instances a special chamber for the sick is required to be kept in reserve in each corporation boarding-house.

Twelfth Question.

	Yes,	No.	Total.
Cotton,	89	5	94
Wool,	91	7	98
Silk,	5	—	5
Flax,	6	—	6
Jute,	1	—	1
Total,	192	12	204

The affirmative answers apply especially to the ventilation and cleanliness of *mills*, many of the replies distinctly stating that “they do not pay special attention” otherwise. In other cases careful attention is given to the sanitary condition of boarding-houses controlled by the manufacturers.

Thirteenth Question.

	Yes.	No.	Total.
Cotton,	88	59	92
Wool,	80	62	92
Silk,	4	1	5
Flax,	1	5	6
Jute,	-	1	1
Total,	68	128	196

Many of those replying in the negative do not own tenements for their employees.

Fourteenth Question.

	Yes.	No.	Total.
Cotton,	60	88	98
Wool,	87	58	95
Silk,	1	8	4
Flax,	2	5	7
Jute,	-	1	1
Total,	100	100	200

In a considerable proportion of the negative responses, the "town authorities" are said to "see to it."

Fifteenth Question.

NUMBER OF HOURS WEEKLY.	Cotton.	Wool.	Silk.	Flax.	Jute.	Total.
50,	—	2	—	—	—	2
55,	—	1	—	—	—	1
59,	—	1	1	—	—	2
59½,	—	1	—	—	—	1
60,	13	10	2	2	—	27
61½,	2	—	—	—	—	2
63,	2	2	—	—	—	4
63½,	1	—	—	—	—	1
64,	2	6	—	1	—	9
64½,	4	8	—	1	—	13
65,	4	6	—	2	—	12
65½,	—	1	—	—	—	1
66,	62	54	2	2	1	121
67,	2	—	—	—	—	2
67½,	2	2	—	—	—	4
68,	—	1	—	—	—	1
68½,	—	1	—	—	—	1
69,	1	2	—	—	—	3
70,	—	2	—	—	—	2
Average,	64.8	64.7	62.2	63.7	66	—
General average, 64.4						

The comparison of death-rates among minors in factories with death-rates among minors in the general population cannot be made in strict compliance with the terms of the Resolve, since we do not know as yet either the numbers of the people at definite ages, or the deaths among them in 1870. This is a matter of little consequence, however, since mortality rates at certain ages are very nearly the same in every year. The rates which prevailed in 1860 and 1865 (years of census) are used in the following table, and we have every reason to believe that the record of 1870 would be similar. The diminished population between the ages of fifteen and twenty in 1865, as compared with 1860, was caused by the loss of young men in the four previous years of war.

IN THE STATE AT LARGE.

Y E A R.	N U M B E R O F M I N O R S .			D E A T H S F R O M C O N S U M P T I O N .			N U M B E R O F D E A T H S T O 1 , 0 0 0 O F P O P U L A T I O N .			N U M B E R L I V I N G T O O N E D E A T H .		
	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.	10 to 14, inclusive.	15 to 19, inclusive.	Total.
1860, . .	114,845	120,799	235,144	75	392	467	.66	3.24	1.99	1,525	308	504
1865, . .	126,691	117,171	243,862	86	397	483	.68	3.39	1.98	1,473	295	505

AMONG MILL OPERATIVES.

1870, . .	3,457	9,410	12,867	4	23	27	1.16	2.44	2.09	864	409	477
-----------	-------	-------	--------	---	----	----	------	------	------	-----	-----	-----

Table showing Comparative Mortality among Minors—Concluded.

IN THE STATE AT LARGE.

Y E A R.	DEATHS FROM OTHER CAUSES THAN CONSUMPTION.			NUMBER OF DEATHS TO 1,000 OF POPULATION.			DEATHS FROM ALL CAUSES.			NUMBER OF DEATHS TO 1,000 OF POPULATION.			NUMBER LIVING TO ONE DEATH.		
	10 to 14, in- clusive.	15 to 19, in- clusive.	Total	10 to 14, in- clusive.	15 to 19, in- clusive.	Total	10 to 14, in- clusive.	15 to 19, in- clusive.	Total	10 to 14, in- clusive.	15 to 19, in- clusive.	Total	10 to 14, in- clusive.	15 to 19, in- clusive.	Total
1860, . .	398	484	882	3.48	4.01	3.75	287	249	267	4.14	7.24	5.73	242	138	174
1865, . .	565	731	1,296	4.46	6.24	5.31	224	160	188	5.13	9.62	7.29	194	104	137

AMONG MILL OPERATIVES.

1870, . .	15	36	51	4.34	3.83	3.96	230	261	252	19	59	78	5.49	6.27	6.06	182	159	165
-----------	----	----	----	------	------	------	-----	-----	-----	----	----	----	------	------	------	-----	-----	-----

The preceding table expresses the principal facts which we were directed to procure *in so far as they can be reached by the means at our command.*

Most of the larger mills have made returns. Most of the smaller mills have not. The aggregate of nearly thirteen thousand minors is certainly a very considerable proportion of the whole number employed in factories in the State.

The correspondence in death-rates between the factory population and the whole population at the same ages is remarkably close, so much so as to leave little to be said. A certain allowance is to be made for the deaths of young men in 1865, the last year of the war. But for that, the deaths from all causes between fifteen and nineteen would have been about the same in the general population in 1865 as in 1860. That this is so is apparent by looking at the deaths from consumption in those two years.

The question concerning deaths by consumption was sent to the manufacturers, because of the fact that very nearly forty per cent. of all the deaths between the ages of fifteen and nineteen inclusive are from this disease in Massachusetts every year.

The same proportion is seen to be also returned in 1870 among the mill operatives.

The result of this inquiry shows that the mortality among minors in factories, *in so far as it is expressed by the returns we have received,* is the same as in the general population.

We think, however, that such returns cannot express the whole mortality incident to factory life.

The operatives are migratory. They do not generally stay in one mill a year. (See table based on the replies to question 7.)

It is reasonable to suppose that when unfit for work by reason of sickness, and particularly when gradually weakened in the first stages of consumption, a certain proportion of operatives go to their homes, or among their friends, and are lost sight of. If this is so it must surely raise the rate of mortality among minors in factories above that of minors in the general population.

On the other hand, it is to be remembered that the young operatives in our mills are drawn for the most part from a class

of foreigners who do not live under circumstances favorable to health, and whose death-rate at all ages is certainly much higher than among the population at large.

The influence of occupations on health is of the greatest interest, and its importance is fully recognized by the Board of Health. It is, however, a subject more difficult to study in this country than in any other country in the world, from the tendency of our people to change their occupations. This difficulty meets us in the present investigation.

It is hoped, however, that the facts which we have been able to collect may be found useful to the legislature and to the people of the Commonwealth.

R E P O R T

ON THE USE OF MILK FROM COWS AFFECTED WITH
"FOOT AND MOUTH DISEASE."

BY ARTHUR H. NICHOLS, M. D., of Boston.

[NOTE BY THE SECRETARY.]

The preceding papers were presented to the legislature in manuscript on the 21st day of January, 1871. At that time the effects upon man of the "foot and mouth disease" in cattle were under investigation by the State Board of Health, but no definite results had been reached. Since that period, and while this volume was being printed, certain facts have been ascertained which it seems important to make known at once, as the disease in question still exists in Massachusetts.

The singular affection of a family in Brighton excited the attention of their physician, Dr. Marion, who reported to us early in January, his belief concerning the cause of the disease.

Dr. Nichols has since conclusively proved the correctness of the diagnosis, and has added much information on the whole subject in the following pages.

The prompt and efficient action of the Cattle Commissioners has been attended with excellent results, but in spite of their efforts it will not be surprising if the disease shall linger among us in some localities for many months to come.

BOSTON, February 23d, 1871.

THE EFFECTS OF THE USE OF MILK FROM COWS AFFECTED WITH APHTHA EPIZOÖTICA.

Aphtha epizoötica, otherwise known as *vesicular murrain*, or *foot and mouth disease*, (*maladie apthongulaire*, *mund-und-klauenseuche*) is an exceedingly contagious disease which prevails among cattle, horses, sheep, deer, goats, pigs, etc., and is characterized by an erysipelatous-like eruption terminating in the formation of vesicles, pustules and ulcers. The attack is generally accompanied by slight feverish symptoms; the animal exhibits an uneasiness in standing, and an unwillingness to move, or if an attempt is made to walk, decided lameness is noticed in one or more limbs. The local symptoms are thus described by George W. Balfour, M. D.*

* Edin. Med. Jour., Feb. 1863, p. 707.

“There is generally a harsh and frequent cough, but this symptom is not invariable; the mucous membrane of the mouth is swollen, and exhibits little reddish elevations; there is a considerable flow of saliva from the mouth, and in about twenty-four hours from the first appearance of the disease, a crop of vesicles is found to be thrown out across the upper part of the mouth, along the sides of the tongue, within the lips, on the muzzle, and in the nostrils.

“Vesicles are also occasionally found around the roots of the horns, and on the external parts of generation, while they are more common in the interdigital spaces and on the udder and teats, and these latter organs are often very much involved in those animals which are far advanced in gestation or in those giving milk. These vesicles are irregular in form, and have neither the central depression nor the distinct inflammatory areola observed in true cow-pox. They are at first about the size of a millet-seed, but gradually increase in size to that of a kidney-bean, or larger. The contents of these vesicles are at first pure lymph, but within a few hours this becomes more or less opaque from the admixture of shreds of lymph and pus corpuscles. Sometimes this fluid is absorbed, and the cuticle desquamates, leaving a raw surface; at other times the vesicles burst and scabs are formed, while in severer cases ulceration occurs which may take eight or ten days to heal. These symptoms all increase till about the third day, after which they commence to decrease, and in mild cases the animal is well in little more than a week.”

The mild nature of the disease may be illustrated by an abstract of the report of Mr. Jeffs, by which it appears that the total number of diseased animals in the Bridgewater district, England, from August 20th to October 1st, 1869, amounted to 1,858 cows, 544 heifers, 431 oxen, 38 bulls and 43 pigs, none of which died.

It seems established then by these and similar observations, that a fatal termination is extremely uncommon, and even where death has taken place, it has apparently resulted not so much from the virulence of the specific poison, as from simple inanition, the ulcerated condition of the mouth and tongue preventing the animal from taking food sufficient for nourishment.

The small number of prominent symptoms, and the fact that there have appeared as yet no spurious forms of the malady,

render the affection easy to distinguish, and one case presents therefore in every essential particular a model of all others.

The above described distemper which in some unknown manner was introduced into England for the first time in 1839,* and which has recently visited this State, presents several features of more than ordinary interest. The manner of its original introduction into the town of Brighton, where it was first noticed; its radiation from this place as a central point, thus penetrating distant counties and States; the mode of its extension, at times moving regularly along through contiguous farms, at others travelling over considerable districts and appearing in remote localities; the development and propagation of the disease as affected by conditions of temperature and other atmospheric influences,—all these present practical and interesting questions for scientific investigation, the solution of which there is reason to believe, would demonstrate most forcibly the utility of “sanitary cordons” and other restrictive measures for preventing the spread of the malady, which have been recently put in operation by the State Cattle Commissioners.

The absence of accurate data renders it impossible to settle conclusively many of these points, and it is proposed therefore in this article to answer merely one question which meets us at the very threshold of all inquiry, viz : in what manner can the disease be communicated to human beings ?

It has long been known to medical men, that children who had been fed with the milk of affected cows, were not unfrequently attacked with vomiting and diarrhoea, but it was maintained that these symptoms might be explained without assuming that the specific poison of the disease had been communicated, since it has been remarked that at the height of the disease, the milk very soon turns sour; it also coagulates upon being boiled, or having its temperature very slightly raised, and moreover has been found at this time to contain pus corpuscles,† and it was thought therefore, that these facts

* Veterinarian, Vol. XIV., p. 184.

† It has not yet been satisfactorily ascertained whether these corpuscles are secreted with the milk, or (as would seem more probable) they derive their origin from the pustules on the udder, and are transferred to the pail by the process of milking. A microscopical examination was made of the milk from one cow seen at Brighton, which was recovering from a severe attack. In this instance neither pus nor parasitic growths were detected, but the milk was found to be sour four hours after it was secreted.

alone were sufficient to account for the above intestinal disorders. The recent outbreak in this State has afforded strong additional evidence that the use of such milk may be followed not only by lesions of the mouth and intestines, but also by a well-marked cutaneous eruption, as shown by cases which occurred in the practice of Dr. H. E. Marion, of Brighton, by whom the method of the introduction of the contagion was distinctly traced.

It seems that shortly after the malady appeared in the cattle-yards at Brighton, it attacked fourteen cows, constituting a dairy which is situated over a mile from the yards. Attention was first attracted to one of the cows from the fact that she refused to eat, and upon examination the entire inner surface of the mouth was found to be covered with a slimy secretion, and numerous ulcers were seen on the lips and tongue. Although this animal was immediately removed from the barn, the others were soon after seized in like manner. It is certain that after the appearance of the disease in the first cow, the milk was for a while consumed as usual, the symptoms not having become sufficiently developed to enable their true nature to be recognized by the milkers,* so that there can be no doubt that the milk of one diseased cow, together with that of thirteen others, at that time unaffected, was distributed to various families, during a period not exceeding two or three days.

In one family, the members of which partook freely of milk from this source, a peculiar disease broke out in the course of five or six days, causing at the same time similar and well-marked symptoms in no less than three individuals, all adults. These symptoms consisted of loss of appetite, nausea, slight acceleration of the pulse, swelling of tonsils and sub-maxillary glands, the appearance of a few vesicles upon the lips and tongue, and a singular cutaneous eruption on the lower extremities, consisting of clusters of papules, vesicles, pustules and ulcers of different sizes,—the latter characterized by a dark-red color, while their peripheral margin was slightly elevated and inflamed. These appearances, in varied stages of development,

* In justice to the proprietor of this dairy (whose pecuniary loss has been heavy), it should be stated, that as soon as the true character of the disease became known, he at once notified all families supplied by him, and ordered all the milk subsequently obtained from diseased animals to be thrown away.

were all seen at one and the same time, indicating that a fresh outbreak of vesicles was taking place as rapidly as the old ones disappeared. In each instance the eruption was confined to one limb, in two instances appearing upon the front and side of the thigh, and in the other just below the knee, and although attended by no great constitutional disturbance, was, nevertheless, rather tedious in its progress, lasting six or seven weeks.

Inquiries were instituted with the idea of ascertaining whether other cases, traceable to this infected farm, existed in the town, and it transpired that another less pronounced instance of the disease occurred at exactly the same time, in a woman who had been supplied with milk from this dairy. Dr. Braman, of Brighton, by whom the case was observed, furnishes the details, as follows :—

“The symptoms here noticed were an efflorescence upon both lips, which at a distance looked swollen and everted, and on closer examination were found to be studded with minute vesicles and apthous patches; decided swelling of the mucous membrane of the gums and nasal cavity, pain and tenderness in the region of the abdomen, and diarrhœa.”

In order to demonstrate more conclusively the specific nature of the cutaneous eruption, quills were charged with the contents of these vesicles in the human subject, and the poisonous element was in this way transferred to the bodies of two young rabbits. At the expiration of two days, the inner surface of the upper lips was found to be swollen and covered with a bloody discharge; later, several small white specks were formed upon the inflamed spots, and the animals were seized with convulsions and died, one in three, the other in four days from the time of inoculation.

Portions of the same lymph were next introduced by the ordinary method of scarification into the arm of a healthy man. In two days vesicles began to form at two of the three points of inoculation, similar to those upon the thigh of the woman from whom the lymph was obtained. In four or five days more, these vesicles, having attained the size of a large split pea, were

ruptured, and in their places appeared unhealthy-looking ulcers, which instead of healing, continued to increase in size.*

The fact that the milk of diseased cows may produce an eruption on the surface of the body of human beings, analogous to that developed in animals, has been satisfactorily shown by Professor Hertwig,† of Berlin, in a series of experiments performed upon himself. He began by drinking daily a quart of fresh milk taken from a diseased cow, and upon the second day experienced a slight fever, contractions of the limbs, headache, heat and dryness of the mouth, and an itching sensation in hands and fingers. Five days later, the mucous membrane of the mouth and tongue became perceptibly swollen, and small vesicles appeared. These vesicles increased in size for a few days, and at last burst, leaving in their place dark apthous patches, which did not disappear for a considerable length of time. Upon the *hands* and *fingers* moreover, vesicles appeared which afterwards burst and dried up in the same manner. Similar experiments were performed by Jacob,‡ at Basle, in which case vesicles were formed upon the chest.

Two cases reported by Dr. J. B. Hislop§ are in this connection, interesting on account of the anomalous character of the eruption :—

“In August, 1862 Mrs. X., the wife of an extensive farmer came under my care, on account of an eruption of bright red spots one-eighth of an inch in diameter, covered with a thin white desquamation, which were so thickly sprinkled over her feet, legs, thighs, and the lower part of her body as to leave only minute interspaces of sound skin. * * * * *

“On a subsequent visit to my patient I found her husband complaining of sore mouth and throat. Upon examination I found the mucous membrane of his lips, mouth, tongue and throat studded with small ulcers giving off a white slough, which left behind it a clean but highly-sensitive cup-shaped cavity ; his forehead was also

* At the present date, (Feb. 22,) twelve days after inoculation, these ulcers have given no indication of healthy action, so that their unequivocal character leaves no doubt as to the contagiousness of the affection, thus distinguishing it from other forms of cutaneous eruption, which though somewhat similar in appearance are nevertheless non-contagious.

A. H. N.

† Medicinische Vereinszeitung, 1834, No. 48, p. 226.

‡ Journal de Médecine Vétérinaire, pub. à l'Ecole de Lyon, Tome II., 1846.

§ Edin. Med. Review, Feb. 1863, p. 704.

covered with an eruption similar to that upon the lower extremities of his wife. As this peculiar combination of symptoms in parties so closely connected was to say the least of it remarkable, I made strict inquiries, and distinctly ascertained that the only cause that could be assigned for this peculiar affection was the circumstance that the whole of Mr. X.'s cows were at that time laboring under the vesicular murrain (*Aphtha Epizootica*). * * * *

"I subsequently ascertained upon inquiry the various other individuals employed about the cattle had suffered from similar symptoms, though in a less degree. * * * *

"Several of the children about the house were also affected with sore throats, but the symptoms in their case were mild. * * * The family were in the habit of freely using the milk fresh from the cows."

The disease is also capable of being communicated by direct contagion, by means of the viscous secretion from the mouths of animals, as well as by the contents of the vesicles.

Hildebrandt* relates instances where contact with these secretions has produced apthous eruption in the mouth, conjunctivitis, and a pemphigus-like eruption on various portions of the skin. Broschet† reports the case of two girls who had milked cows with diseased udders, upon whose fingers and toes there appeared swollen spots, upon which spots were afterward formed vesicles, analogous to those on the udders of the cows which they had milked.

The above views may be thus stated in a condensed form.

1. It is proved that *Aphtha Epizootica* may be communicated to man through the medium of diseased milk, as well as by direct contagion.

2. The disease produced in human beings by the use of this milk is not usually to be dreaded, for it is by no means formidable; it is generally limited to a sore mouth, and in very rare instances is accompanied by an eruption on the surface of the body. The use of such milk by feeble persons and young children might however be followed by more serious consequences.

In no well ascertained case has it been found that any ill effects have been produced by eating the flesh of diseased animals, although there is abundant evidence that at the outbreak

* Magazine für Thierh. 1840. VI. 2.

† Die Maul und Klauenseuche der Rinder, etc. Dresden, 1820.

of the distemper in Massachusetts, and before public attention had been directed to its true character, a considerable number of animals, in which the usual premonitory symptoms had appeared, were slaughtered and their flesh sold.

In accordance with the general law that animal poisons are destroyed when subjected to a very high temperature, we are justified in believing that the affection can never be communicated to man through the medium of the meat, provided it be thoroughly cooked, and upon the same principle the milk might be rendered innocuous by being boiled.

